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Personnel ; Final Report
Dec. 15, 1945

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PERSONNEL DEPARTMENT: FINAL REPORT

PERSONNEL DEPARTMENT

FINAL REPORT

1945

PERSONNEL DEPARTMENT: FINAL REPORT

I: INTRODUCTION

Historically, the work of the Personnel Department falls into three main phases. In the first, the Department's major responsibility, which took precedence over all its other duties, was the recruiting of personnel. In the second, the Department's essential job was, in the very broadest sense, to contribute what it could to the most effective utilization of the personnel which had been recruited. In the last phase, its major responsibility was the demobilization of personnel as the Laboratory completed its work.

These three phases overlapped. There was no one day upon which it was possible to say that the major responsibility shifted from recruiting to "utilization"; and the first tentative preparation for demobilization began in what may be regarded either as the end of the first phase or as the beginning of the second. However, for convenience, the first phase may be considered to extend from the first days of the Laboratory until about April, 1944; the second from April, 1944, to August, 1945; and the third from August 15 until whatever time the Personnel Department may be finally closed.

The first phase may be subdivided into two periods. During the first period (beginning in March, 1942, when the Radio Research Laboratory first became a separate contract) Dr. Roger W. Hickman, then Associate Director of the Laboratory, carried on all recruiting and other personnel activities as one of his many responsibilities. The second period began in October, 1942, when Mr. W. T. Harrison was employed as Personnel Director. During the second period of the first phase, the Personnel Department reported to the Associate Director who, in turn, reported to the Director. By the end of this phase, the Department consisted of seven people.

The second phase has been said to begin about April, 1944. This date is chosen somewhat arbitrarily; recruiting continued to be a major responsibility for some months thereafter; on the other hand, some months previously Mr. Harrison had added to the Department two administrative assistants (Nile and Sutherland) in order to provide for more adequate attention to personnel functions other than recruiting. Therefore, for lack of a better dividing line, April, 1944, may be considered the end of one phase and the beginning of another because it was in that month that Mr. Harrison resigned as Personnel Director and Mr. Sutherland was appointed to succeed him, and because at the same time the position of the Personnel Department in the organization was changed so that the Department reported simultaneously to a Committee on Personnel (of which the Director was Chairman) and to the Business Manager. By the end of this second phase, the Department consisted of eleven people.

The third phase began shortly before V-J Day. Very soon thereafter, because of the increased responsibilities thrust upon the Department by rapid demobilization and simultaneous placement activity, the Department was expanded until it had approximately 30 members. At the time of this writing, the load of the Department has passed its peak. The total number of people now employed in the Department is 14, and is expected to decrease, by January 2, 1946, to about 10. In this phase, the Department's position in the organization was again changed. From about V-J Day as long as the Director maintained residence in Cambridge (i.e., until December 8), the Department reported to the Director. Since December 10 it has reported to the Business Manager.

Through all these phases the Laboratory had the cordial co-operation and active assistance of the Harvard University Department of Personnel Relations.

II: THE FIRST PHASE

The Radio Research Laboratory, the youngest of the major NDRC laboratories, was established after most of the competent available physicists in the country had been secured by other war projects. Its success in collecting a competent and adequate staff in the face of what seemed to be very grave difficulties was due to a number of factors. Of these, perhaps the most important was the Laboratory's decision to recruit its staff largely from radio engineers rather than physicists. During 1942, radio engineers were not yet in such demand as they were later by other war laboratories or by industry. In fact, certain industries, hampered by priorities and other restrictions, found themselves temporarily overstaffed with competent engineers whom they were glad to lend to the Radio Research Laboratory on a leave-of-absence basis. For example, the Laboratory in this way obtained a number of men from CBS, some of whom stayed with the Laboratory for a relatively short time, others of whom remained until after V-J Day. Through such men, other distinguished radio engineers in turn were brought to the Laboratory. The second factor which assisted in successful recruiting was the prestige of the early acquisitions; a number of the young men who were later offered jobs were influenced to come here partly by the prestige of the University, and to a large extent by the personal prestige of the distinguished radio engineers who were on our staff by the fall of 1942.

In general, the Laboratory obtained relatively little help from the personnel offices of OSRD and NDRC. It was chiefly through the personal efforts of the Director and the Associate Director in their own circles of acquaintances and, in turn, through similar efforts on the part of the men whom they brought in, that the Laboratory obtained the nucleus of its research associate personnel.

For the first several months of the Laboratory's existence, the recruiting activity concentrated very largely on research personnel. In something less than eight months from the time it was established as a separate project, the Laboratory had already engaged some 35 of the men who were to form the backbone of its technical administrative staff through the greater part of the following three years. Among these men were the Director, the three men who later held the title Associate Director, all but two of the men who became heads of technical divisions, and a very substantial proportion of its future group leaders. During the same period it had hired only some six men of comparable responsibility in the non-technical activities.

By the time the Personnel Department was formed, it was generally recognized that the Laboratory was seriously understaffed with service personnel. Therefore, although the Department actively participated in the continuing recruiting of Research Associates, it assumed as its major responsibility the hiring of the necessary non-technical personnel and sub-professional technical personnel. Within something less than a year after the formation of the Personnel Department, the proportions approached a figure which remained relatively constant throughout the rest of the Laboratory's history until demobilization was well under way: approximately one Research Associate to three service employees.

Although it was possible for the Laboratory during 1942 to hire a substantial number of mature and experienced engineers and physicists to form the nucleus of the technical staff, it was impossible to hire enough such people to meet the total technical demands of the program. It was necessary, therefore, to hire young men in graduate schools or directly from undergraduate work. As a result, the professional technical staff of the Laboratory included a large proportion of young men. This fact later became troublesome, because of Selective Service pressures. To offset the then forseeable Selective Service problem as much as possible, the Laboratory was forced to complicate its difficulties of hiring service personnel by adopting a policy

of hiring such employees when possible from female applicants or from male applicants disqualified from military service by age or disability.

Exhibits I, II, III, and IV present statistics, taken from appropriate periods in the Laboratory's history, on the results of the recruiting program. Exhibit I shows the proportion of engineers to physicists in July, 1945, the end of the Laboratory's relatively stable period. Exhibit II shows from what backgrounds these research associates were obtained. Exhibit III shows the geographical source from which all male employees (as of July, 1945) of the Laboratory were drawn;[1] no similar tabulation was made for female employees, since virtually all of the women were drawn from the Greater Boston Area. Exhibit IV shows the age and sex distributions of various classifications of employees in the Laboratory at the two periods when Selective Service pressure was greatest.

III: THE SECOND PHASE

To describe the Personnel Department's essential job, during its second phase, as "to contribute to the most effective utilization of the personnel which had been recruited" is to state the Department's aim in somewhat abstract and oversimplified form, rather than to describe its activities. In order to achieve this aim it undertook to improve activities which it had carried on during the first phase, and also undertook certain new activities. Many of these activities were of no direct interest to the employees of the Laboratory, but were primarily for the purpose of providing management with desirable records, reports, and controls. Others were undertaken simply in the interest of increased departmental efficiency. Many, however, were of immediate interest to the personnel of the Laboratory.

It is impossible, in a short report, to give an adequate picture of the department's day to day activities, particularly with respect to its work directly with Laboratory personnel, since so much of its work consisted of minor services to individual employees (such as conferences to soothe ruffled feelings, or tactful explanations of the Laboratory's inability to buy a set of false teeth to replace a set lost in the building). The following paragraphs attempt nothing more than a brief survey of certain of the Department's major tasks during its second phase.

A. Maintaining Records, System, and Controls

Late in the Spring of 1944, the Department began a revision of its internal systems such as filing, investigations and clearances, badge procedures, termination routines, and personnel records. It installed a system of job classifications, coordinated but not identical with Harvard University's system. In connection with the first written formulation of the Laboratory's salary policy (see Section III D 3) it set up machinery for the equitable administration of the salary policy (including complete and accurate salary records, the tickler file of dates for salary reviews, and notification to the supervisor and then to the individual concerned of approved salary changes).

With respect to records, its major new task was the initiation and administration of an attendance record system. This system, installed after two years of

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[1] So many of the Laboratory's employees came to us directly from undergraduate study or from temporary war jobs that it is not always easy to decide where an employee's "permanent home" is. For convenience, Exhibit III lists as geographical sources the state in which a man registered with Selective Service.

the Laboratory's existence during which the tradition had grown up that there was no general check on attendance, met with major opposition throughout the Laboratory and was never entirely effective nor entirely satisfactory either to the general personnel or to the Department. Nevertheless, notwithstanding its defects, it proved itself a control of very considerable value to the management of the Laboratory.

During this phase the Department also made a number of elaborate statistical studies of the salary history of the Laboratory in the form of reports to the Business Manager and an extensive report to the attorneys of the University. These reports served not only as useful guides in the future administration of salary policy, but also helped to preserve the Laboratory's flexible salary policies in the face of increasingly stringent controls on the part of the War Labor Board and the U.S. Treasury.

B. Maintaining Discipline

The responsibilities of the Department for hiring, disciplining, and firing were never formally stated, and were not generally understood by all employees. The Department had the authority to hire, discipline, or discharge only Personnel Department employees. This is a normal and desirable limitation upon the authority of any Personnel Department. However, in this Laboratory so many of the people in supervisory positions had not had previous supervisory experience (or had primarily technical rather than administrative interests) that there was a general distaste on the part of Laboratory supervisors for disciplinary action, and above all, for disciplinary discharges. Consequently, upon occasion, laxities prevailed which were not to the best interests of the Laboratory. In such cases, the Personnel Department exerted a gentle pressure upon the supervisor concerned to take appropriate disciplinary action. Unobtrusive as it generally was, this effort to counteract flaccidity of discipline (of course, without any thought of imposing rigid disciplinary standards) was one of the Personnel Department's significant contributions to the Laboratory's program.

C. Maintaining the Staff

"Maintaining the staff" included not only all activity designed to discourage undesirable voluntary terminations and keeping the turnover rate at a minimum, but also, and primarily, meant obtaining the necessary draft deferments so that essential employees were not lost to the Laboratory through the operation of Selective Service.

1. In general, the working conditions in the Laboratory, in the broadest sense of the term, were so pleasant that the problem of discouraging undesirable resignations was relatively simple. Throughout the history of the Laboratory, periodic statistical surveys indicated that the Laboratory's turnover figures for all classes of employees were substantially below nation-wide averages. However, occasionally the University's honest effort to comply with executive salary and wage regulations brought the University's rates out of line with going rates in the area. The revision of segments of the Laboratory's salary and wage structure following the necessary investigations, was a recurring part of the Department's job of keeping employees contented. Occasionally, particularly in 1944 and early 1945, there were cases where an individual employee could not be dissuaded from his determination to leave the Laboratory. In such cases, the Department administered the Laboratory's (and the University's) broad policy: if the employee's reason for wishing to leave was one acceptable to the WMC, the employee was granted a release; if not, the Laboratory refused to grant a release. In certain cases, there resulted hearings before the WMC, in each of which the Laboratory was sustained.

2. One of the acute problems faced by all employers during the war years was obtaining deferment for essential male employees who were qualified for military service. This problem was particularly acute for the Radio Research Laboratory, since such a large proportion of its technical staff was composed of young men employees.

Harvard University very early laid down the rigid policy that deferment would not be requested for any man qualified for military service unless he had high technical qualifications. This was the basic Selective Service policy of the Laboratory and the foundation of its success in meeting draft problems. Our extensive use of women in all technical jobs for which we could find qualified women applicants, our obvious effort to employ men disqualified for service, our willingness to discuss our problems frankly with the State Director, and our demonstrable effort to cooperate with Selective Service authorities, plus the support of OSRD, brought us through the various Selective Service crises without the loss, after April 1, 1944, of a single man for whom we requested deferment.

However, although the Laboratory lost no essential men to Selective Service during the period under discussion, there is no doubt that the succession of draft crises (in the Spring of 1944 and periodically thereafter) cost heavily in terms of Laboratory productivity. The men concerned in the several crises, faced with the possibility of complete disruption of their personal plans and the need to make alternate arrangements, were unable to work with their accustomed concentration. This loss was an inevitable consequence of the national policy under which group deferments were illegal.

D. Maintaining Morale

A very large part of the Department's effort to keep employees contentedly at work consisted of the individual conferences with, or services to, the employee concerned. These services ranged from matters intimately concerned with the work to matters entirely persohal. No documentation is possible for this phase of the job. Certain activities, however, did affect large groups of people and should be mentioned in the report. Of activities of this sort, perhaps the three major matters had to do with the travel and moving expense policy, the salary policy and its administration, and the Department's effort to institute an informational program.

1. The administration of the travel and moving expense policy has been, in so far as the Department was responsible for it, one of the Personnel Department's less successful efforts. The pertinent contract provisions were, to the layman, broad and unambiguous and were so interpreted by various interviewers for Radio Research Laboratory. In September, 1944, OSRD issued its first administrative interpretations of this clause in the contract. The result, Administrative Circular 22.08, was both ambiguous and severe, and entirely at variance with the hopes and expectations of those who had read the contract and drawn individual conclusions therefrom. Successive OSRD interpretations of this Administrative Circular rendered the policy progressively less liberal. By the time the demobilization of the Laboratory was well begun, it was apparent that either the University would have to dishonor promises made in good faith by its accredited agents or seek a liberalization of some of OSRD's narrower interpretations of the policy.

The Personnel Department had an interest in the administration of this policy, and was to a considerable extent responsible for the dissatisfactions connected with it, since members and agents of this Department were responsible for most of the commitments which were made to employees at the time of hiring. However, as it became apparent that "interpretation" of the policy was necessary, and that many

different interpretations were possible, the Department did not feel competent to render firm decisions with respect to what was and was not allowable under the policy. Therefore, in all questionable cases, the employee concerned has been referred to the Business Manager. Particularly in view of the difference between what OSRD obviously wanted us to do and what it was willing to authorize us in writing to do, the Business Manager has been extraordinarily successful in satisfying most employees who believed that they have any claim upon the Laboratory for return travel and moving expense. But the matter has cost a great deal of time and energy, and at one time or another has been productive of serious resentment directed, in most cases, not at OSRD or even at those administering the policy but at the University.

2. Originally, the classification of the Laboratory's work was so high that the policy generally followed was to tell each employee no more about the program than he needed to know in order to perform his own immediate job. In the excitement of the early days of the Laboratory, this practice may have had no serious effect upon the morale of the service employees, who were permitted to know almost nothing about the Laboratory's work--many of whom, in fact, did not know what the initials RCM signified. However, as the Laboratory passed through its stimulating phase of rapid growth, as the progress of the war became more encouraging, and as the Laboratory settled down to the long pull, many service employees felt that they were working in a vacuum and lost the sense of urgency and importance of their often routine and essentially unexciting jobs.

To offset this condition, which unquestionably had a general and adverse effect on morale, the Personnel Department attempted to initiate an informational program which would tell employees of the nature of the Laboratory's work, the successes which it had already achieved, and the urgency of the remaining program. For this purpose various talks were scheduled by technical men, within and without the Laboratory; also, movies which were thought appropriate were shown on Laboratory time. The Department's effort in this respect was partially successful. The information which it did get to the rank and file of the Laboratory personnel did result in a more general understanding of the work and its importahce. However, the success was by no means complete. A large amount of time hunting through film catalogs failed to locate anything like a desirable number of appropriate films. Equally vigorous efforts to obtain qualified speakers were only partially successful. The problem of finding speakers with first-hand information was inherently difficult since it also meant finding men who were interested in the morale problem concerned, who were able to give the necessary time, and who could speak effectively. In retrospect, it seems possible that a more effective informational program could have been arranged if the Department had scheduled more frequent meetings for all non-technical personnel, and for speakers had relied less upon technical men with first-hand information, but had itself undertaken to obtain this first-hand information and pass it along second-hand but in an effective fashion to the non-technical personnel.

3. OSRD Administrative Circular 5.21 set forth a number of optional salary policies, all of them acceptable to OSRD. For practical reasons, the policy which we, like other OSRD laboratories, were forced to adopt as our basic policy was the "no gain, no loss" policy. This policy was temporarily effective in that it enabled the Laboratory to recruit the employees it urgently needed, on terms which were satisfactory to its employees at the time of recruitment. However, it resulted in many major inequities which became apparent when the employees concerned actually began working for the Laboratory and it became possible to assess and compare their relative values to the program. Furthermore, the "no gain, no loss" policy referred only to a starting rate. Notwithstanding the Executive Wage and Salary Freeze Order, salaries outside the Laboratory tended to increase at a rate more rapid than usual; also, able young men who came to the Laboratory with little or no previous work experience were given increasing responsibilities at an extraordinarily rapid rate. Therefore, from

time to time it became essential to adjust the salaries of a large number of the Laboratory's employees.

The necessity for the adjustment of salaries was recognized in the early days of the Laboratory. Furthermore, it was recognized that because of the rapid increase of responsibilities consequent upon the rapid growth of the Laboratory, and also because of the impermanence of employment in the Laboratory, it was appropriate that salary reviews should be held for the majority of the Laboratory's employees at fairly frequent intervals. Thus an informal salary policy evolved during the first year or year and a half of the Laboratory's existence. However, no adequate machinery was set up for some time to insure that this somewhat nebulous policy was consistently put into practice. As a result, a substantial number of employees of the Laboratory began to feel varying degrees of grievances with respect to salary. Shortly after the change of personnel directors in the Spring of 1944 these grievances threatened to increase to serious proportions. Therefore, the former personnel director was invited to participate in a written formulation of the salary policy of the Laboratory. At the same time the machinery described in Section III A was installed. On the basis of the clarified policy, so far as possible old inequities were adjusted. Thereafter, the salary policy itself became much more clearly understood by personnel generally, and the administration of the policy became more systematic. In the months following, the salary policy and its administration became generally satisfactory to the personnel of the Laboratory.

IV: THE THIRD PHASE

The third phase of the Personnel Department's activity can properly be evaluated only if conditions prevailing outside the Laboratory at the same time are kept in mind. As late as July, 1945, the management of the Laboratory was planning a gradual demobilization beginning perceptably in August, 1945, and continuing for approximately a year. The sudden end of the war forced a major revision of this schedule. Under the new circumstances, the Management Committee felt three major obligations with respect to personnel:

(1) To retain the services the employees needed for the job of completing the program of the Laboratory to the satisfaction of the various agencies and organizations concerned, notwithstanding the relaxation of War Manpower Controls.

(2) To complete the program as efficiently as possible and without unjustified and unnecessary expenditure of Government funds.

(3) As far as consistent with (1) and (2), to spare the employees of the Laboratory all avoidable hardship which might come through the unexpectedly sudden termination of the Laboratory's activity.

In carrying out its responsibilities under these three broad principles of the Management Committee, the Personnel Department was faced with several major problems connected with the dissolution of the Laboratory: the allocation of personnel during the period while the Laboratory was shrinking rapidly, the physical task of handling a large number of terminations, and the job of helping employees find themselves suitable positions to go to when their work here was completed.

A. Allocation and Termination

To meet the first of these problems three pools were set up: one of Research Associates and all male technicians, one of all other male employees, and one of women employees. Upon the completion of his regularly assigned work an employee was placed in one of the pools. From the pools personnel was assigned to other jobs according to the skills required. The supervisors of the pools also maintained constant liaison with department heads to be sure that employees were assigned to pools as soon as they were actually available. This arrangement and the consequent breakdown of departmental lines secured the flexibility so essential in a time of rapidly shifting loads. With the excellent co-operation of all employees it was possible to channel the total force of the Laboratory into an efficient attack upon the jobs yet to be done. The effectiveness of many employees in work quite different from their regular assignments emphasized once again the wartime usefulness of competent personnel in fields far removed from their normal activities.

Another important objective was achieved through the pool arrangement. Early in the demobilization process it was decided by the Management Committee that no employee was to be laid off without thirty days' notice. Although it was difficult to estimate just when any individual's regular work would be finished, the flexible pool system made it possible to make full use of each employee during the notice period. Thus, without waste, hardship cases were avoided.

The administration of these pools and the necessarily complicated termination procedures required an expansion of the department. A separate Terminations Office was set up, and careful planning made the actual departure of each employee proceed without undue confusion.

B. Placement Assistance

By midsummer of 1945, the end of the war, although not expected by August, was definitely in sight. Internal unrest grew as employees became increasingly concerned about post-war jobs. Also, Service laboratories and industrial organizations sent representatives to Radio Research Laboratory requesting permission to interview Research Associates for post-war jobs. As employees learned of the interest of prospective employers, it became necessary, in the best interest of the program, to permit interviews upon the premises, where they could be to some extent controlled by the Laboratory, and where the Laboratory by participating could influence the timing of offers, in order to protect itself from a too sudden and crippling loss of personnel. The Personnel Department, therefore, became responsible for facilitating employment interviews.

The demand for scientists and engineers familiar with the most advanced electronics techniques has been great; also, employers who came seeking primarily such professional technical employees have, in many cases, also taken advantage of the opportunity to obtain here sub-professional technical employees and non-technical employees familiar with the requirements of a development laboratory. The results of the interviewing program, therefore, have been gratifying; while the Laboratory was shrinking from more than 700 to less than 300 members, less than a dozen employees did not have suitable jobs to go to when they left the Laboratory. Of all the Personnel Department's activities, probably its participation in the interviewing program has been the most productive of employee good will toward Harvard.

December 15, 1945

EXHIBIT I

RESEARCH ASSOCIATES: PROFESSIONAL FIELDS

Total Number of Research Associates	Physicists	Electrical Engineers	All Others
192	52	116	24

EXHIBIT II

RESEARCH ASSOCIATES: EMPLOYMENT EXPERIENCE

Previous Professional Experience, all Research Associates:

Hired from Industry	Hired from Teaching	Hired from Graduate Study	Hired upon Completion of Undergraduate Study
69	51	22	50

EXHIBIT III

MALE EMPLOYEES: GEOGRAPHICAL SOURCES

State	Res. Assoc.	Technicians	All others
Alabama	1	0	0
California	33	5	1
Colorado	2	0	0
Connecticut	2	4	3
District of Columbia	2	0	0
Florida	2	0	0
Idaho	2	0	0
Illinois	9	1	0
Indiana	4	0	0
Iowa	3	0	0
Kansas	3	0	0
Kentucky	0	1	0
Louisiana	1	0	0
Maine	3	13	5
Maryland	1	1	0
Massachusetts	40	62	204
Michigan	6	0	0
Minnesota	1	2	0
Missouri	3	3	0
Nebraska	1	0	0
New Hampshire	1	2	3
New Jersey	6	0	1
New York	25	6	5
North Carolina	1	0	1
Ohio	3	2	0
Oklahoma	1	1	0
Oregon	7	0	0
Pennsylvania	4	0	1
Rhode Island	1	1	3
Tennessee	2	0	0
Texas	9	0	0
Utah	1	0	0
Vermont	1	1	0
Virginia	0	0	1
Washington	7	2	2
Wisconsin	4	1	1

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PERSONNEL CLASSIFICATION BY AGE AND TYPE OF WORK

Table I

	Total	Men	Women
GROUP I	199	196 (98.5%)	3 (1.5%)
GROUP II	183	143 (78.2%)	40 (21.8%)
GROUP III	107	92 (86%)	15 (14%)
GROUP IV	305	112 (36.8%)	193 (63.2%)
GROUP V	34	30 (88.3%)	4 (11.7%)
	828	573	255

Table II

	Men not disqualified for military service					Men disqualified for military service; classified "F", "L", or "1-C"
	Under 22	22-25 (inc.)	26-29 (inc.)	30-37 (inc.)	38 & over	
GROUP I	none (0%)	51 (26%)	41 (20.9%)	38 (19.4%)	38 (19.4%)	28 (14.3%)
GROUP II	none (0%)	3 (2.1%)	18 (12.6%)	35 (24.6%)	48 (33.6%)	39 (27.1%)
GROUP III	none (0%)	1 (1.1%)	12 (13%)	22 (23.9%)	48 (52.2%)	9 (9.8%)
GROUP IV	1 (.9%)	none (0%)	1 (.9%)	11 (9.8%)	64 (57.1%)	35 (31.3%)
GROUP V	none (0%)	none (0%)	1 (3.3%)	5 (16.7%)	22 (73.3%)	2 (6.7%)
	1	55	73	111	220	113

Explanation of Groupings:

Group I Professional Technical Personnel
Group II Non-professional Technical Personnel
Group III Skilled Shop Personnel
Group IV Non-technical Service Personnel
Group V Administrative Personnel

Percentages given in Table I are percentages of men and of women in each group.
Percentages given in Table II are percentages of men in each group.

January 31, 1945

PERSONNEL CLASSIFICATION BY AGE AND TYPE OF WORK

	Table I			Table II					
				Men not disqualified for military service					Men disqualified for military service; classified "F", "L", or "1-C")
	Total	Men	Women	Under 22	22-25 (inc.)	26-29 (inc.)	30-37 (inc.)	38 & over	
GROUP I	198	189 (95.5%)	9 (4.5%)	10 (5.3%)	61 (32.3%)	37 (19.6%)	40 (21.2%)	32 (16.9%)	9 (4.7%)
GROUP II	173	141 (81.5%)	32 (18.5%)	3 (2.1%)	8 (5.7%)	23 (16.3%)	25 (17.7%)	53 (37.6%)	29 (20.6%)
GROUP III	122	94 (77%)	28 (23%)	0 (0%)	7 (7.4%)	12 (12.8%)	20 (21.3%)	44 (46.8%)	11 (11.7%)
GROUP IV	263	93 (35.4%)	170 (64.6%)	7 (7.5%)	0 (0%)	2 (2.2%)	15 (16.1%)	50 (53.8%)	19 (20.4%)
GROUP V	25	24 (96%)	1 (4%)	0 (0%)	0 (0%)	1 (4.2%)	3 (12.5%)	18 (75%)	2 (8.3%)
	781	541	240	20	76	75	103	197	70

Explanation of Groupings:

Group I Professional Technical Personnel
Group II Non-professional Technical Personnel
Group III Skilled Shop Personnel
Group IV Non-technical Service Personnel
Group V Administrative Personnel

Percentages given in Table I are percentages of men and of women in each group.
Percentages given in Table II are percentages of men in each group.

March 15, 1944

Stanford University Archives
SC 160 SERIES I
Box 3 Folder: 4

Personnel : Placement office
1945-46

RADIO RESEARCH LABORATORY

HARVARD UNIVERSITY

MEMO TO: Management Committee - Terman, Cullum, Byrne, Breed, Harris; Oliphant, sec'y

FROM: Gordon Sutherland DATE: October 9, 1945

SUBJECT: Placement Office Report for Week ending October 9, 1945

Total interviews to date: 1690

Total number of organizations in: 118

Title	Total offers to date	No. individuals receiving offers	No. jobs accepted
Research Associates	155	86	32
Draftsmen	27	12	9
Miscellaneous	13	12	7
Skilled Craftsmen	21	19	9
Radio Technicians	25	20	11
Clerical	2	2	0
Totals	243	151	68

Total Number of Cards left in Deck

Research Associates	84
Draftsmen	16
Miscellaneous	73
Skilled Craftsmen	64
Radio Technicians	43
Clerical	72
	352

RADIO RESEARCH LABORATORY

HARVARD UNIVERSITY

MEMO TO: Miss McCafferty

FROM: Placement Office

DATE: April 3, 1946

SUBJECT: Report on Placement Activities at RRL for the month of March, 1946

During the month of March, 81 people terminated their employment with the Radio Research Laboratory. The attached sheet indicates what happened to each person who left during the month.

Bridges, Mary
Brown, Evelyn
Kelly, Virginia
Leonard, Virginia
Larson, Frank G.
Baker, James
Bond, Dorothea
Pope, Irene
Saltmarsh, Katharine
Sawyer, A. Earl
Shaw, James
Smith, Alice
Sprague, Phebe
Starkweather, Barbara
Wright, Frances
Wright, Doris

EMPLOYEES RESIGNING DURING MONTH OF MARCH, 1946

MM

Aldrich, Mary — Clerk
Amole, Frank — Cabinet Maker

Asher, Martha — Sr. Secretary
Christian, Catherine — Jr. Clerk
Derry, Hugh — Asst. Photographer
Demetropoulos, Charles — Sr. Mechanical Draftsman
Dunton, Jeanne — Jr. Librarian
Earle, Robert — Cabinet Maker
Fergie, Fraser — Photographer
Fortune, Edward — Tool & Stock Man
Fry, Sylvia — Jr. Librarian
Geller, Carl — Mechanic Assistant
Haley, Mary — Sr. Clerk
Hart, Fred R. — Supt., Machine
Penfield, Lloyd — Asst. Illustrator

April 3, 1946

RESIGNATIONS DURING MARCH, 1946

Radio Research Laboratory --- Harvard University

Baghdoyan, Shogher	Scientific Illus.	**MIT
Beach, Barbara	Multilith Plate Maker	Dr. Gardner
Burns, June	Switchboard Operator	USO, Boston
Cola, Irene	Sec.-Stenog.	To be at home
Cumming, Isabel	Sec.-Stenog.	*MIT
Cutter, Watson	Supt.Bldg.Operations	Has several leads
Dalton, George	Sr. Scientific Illus.	*ATSC
Fitzgerald, Eleanor	Clerk	Simplex Wire & Cable Co.
Forget, Robert	Photographer	Returning to school
Granger, Katherine	Sr. Secretary	To be at home
Hagen, Ethel	Ozalid Operator	To be at home (going abroad)
Harrington, Ruth	Sr. Clerk	Dix Lumber Company
Horvath, Rita	Typist	*ATSC
Jones, Evelyn	Clerk	ATSC
Kelly, Virginia	Sr. Secretary	*Polaroid
Leonard, Virginia	Radio Technician	To be at home
Lunden, Frank O.	Cashier	Transferred to H. U. (HAA)
Maher, James	Asst.to Adm.Spvr.Shops	Raytheon
Mead, Dorothea	Typist	No help requested
Popa, Irene	Sr. Secretary	Cruft Lab., Dr. Hickman
Salvucci, Katherine	Switchboard Operator	Blue Cross
Sawyer, A. Earl	Production Manager	Adult Education Center
Shaw, James	Supvr. Utility Men	*ATSC
Smith, Alice	Teletype Operator	*ATSC
Sowles, Phebe	Sec.-Stenog.	To be at home
Sturtevant, Barbara	Sr. Secretary	*AIL
Wright, Frances	Sr. Clerk	To be at home
Wright, Marie	Sec.-Stenog.	*ATSC

EMPLOYEES RECEIVING LAY-OFF NOTICES AND TERMINATING DURING MARCH, 1946

Adduci, Mary	Clerk	Metropolitan Life Ins. Co.
Annis, Frank	Cabinet Maker	Has several positions to choose from
Anton, Martha	Sr. Secretary	Wants temp. job--referred to H.U.
Chouljian,Catherine	Jr. Illustrator	**Not required to assist
Darcy, Hugh	Asst.Stkrm.Manager	Has an offer
Demetropoulos, Charles	Sr.Scientific Illus.	Mass. School of Art
Dunton, Jeanne	Jr. Illustrator	**Not required to assist
Earle, Robert	Cabinet Maker	No help requested
Forgie, Fraser	Photographer	**Not required to assist
Fortune, Edward	Tool & Stkrm, Mgr.	*Raytheon
Fry, Sylvia	Jr. Illustrator	**Not required to assist
Fuller, Carl	Stockroom Assistant	ATSC
Haley, Mary	Sr. Clerk	To be at home
Hart, Fred R.	Supt., Woodshop	To be self-employed
Kentfield,Lloyd	Sci. Illustrator	*MIT

EMPLOYEES RECEIVING LAY-OFF NOTICES & TERMINATING (Continued)

Knight, Paula	Jr. Illustrator	**Not required to assist
Lindergreen, Harold	Sr. Scientific Illus.	**Now re-employed by RRL
Locke, Arthur E.	Expediter	Has offers
MacKinnon, F. Roy	Stockroom Assistant	Has offer
McCullough, Melbourne	Delivery Clerk	Has offer
Mahoney, Mary	Switchboard Operator	On call
Massey, George	Utility Man	Has leads - 1-A
Morano, John	Utility Man	No help requested
O'Brien, Ernest	Stockroom Assistant	Has offer
Portanova, Joseph	Pattern Maker II Cl.	Has offer
Preston, Ralph	Sr. Scientific Illus.	**Not required to assist
Raymond, Ruth	Clerk	*American Unitarian Assoc.
Serra, Thomas	Multilith Operator	**Has position
Tice, Grant	Rec. & Ship. Floorman	**Not required to assist
Tompson, Samual	Raw Stock Inspector	Raytheon
Williams, Joseph	Cabinet Maker	Fred Hart

TRANSFERS

Andersen, Holgar	Pattern Maker II Cl.	Harvard University
Arnold, Neal	Sheet Metal Worker	Harvard University
Biergiel, Justin	Janitor	Harvard University
Brennan, James	Guard	Harvard University
Brooks, Augustus	Janitor	Harvard University
Burrows, George	Head Guard	Harvard University
Dillon, Francise	Guard	Harvard University
Donovan, Miriam	Typist	Dr. Van Vleck
Dorgan, Katherine	Maid	Harvard University
Holland, William	Pattern Maker I Cl.	Harvard University
Jackson, George	Asst. Night Super.	Harvard University
Landry, Frances	Maid	Harvard University
Lanigan, Edmund	Guard	Harvard University
MacIntosh, Bernard	Guard	Harvard University
McMurray, Thomas	Guard	Harvard University
McNamara, Mary	Maid	Harvard University
Martin, Walter	Guard	Harvard University
Regan, Daniel	Guard	Harvard University
Rodden, James	Guard	Harvard University
Rogers, Henry	Guard	Harvard University
Stevenson, Peter	Guard	Harvard University

Also on February's report should have gone the name of Marjorie Butler, Typist (Temporary) who terminated on February 28 and whom we were not required to assist.

RADIO RESEARCH LABORATORY

HARVARD UNIVERSITY

MEMO TO: Dr. Terman cc: G. Sutherland, F.W. Taft

FROM: Gordon Sutherland DATE: April 8, 1946

SUBJECT: Placement Report for week ending April 6, 1946

Title	Offers To Date	No. Individuals Receiving Offers	No. Jobs Accepted
Research Associates	243	106	68
Draftsmen	54	22	21
Miscellaneous	56	49	41
Skilled Craftsmen	70	46	40
Radio Technicians	64	48	45
Clerical	46	42	30
	533	313	245

Available Personnel

Research Associates	4
Skilled Craftsmen	4
Radio Technicians	1
Clerical	9
Miscellaneous	16
	34

Jobs Offered During Week

M- Duffy, French

Jobs Accepted During Week

M- Duffy, French

160 SERIES

Stanford University Archives
SC 160 SERIES I
Box 3 Folder: 9

Post-war; N.D.R.C. Division 15
1948-57

POSTWAR NDRC DIVISION 15

APR 16 1948

Minutes of the Third Annual Reunion

March 25, 1948

at the Williams Club, New York City

1. Attendance

Andrew Alford, Owner, Andrew Alford Consulting Engineers,
299 Atlantic Ave., Boston 10, Mass.
H. H. Beverage, Director Radio Systems Research, RCA Laboratories,
66 Broad St., New York 4, N.Y.
K. C. Black, Chief Engineer, Air Associates, Inc.
Teterboro, N. J.
W. C. Boese, Engineer Technical Information Division, FCC,
7025 Wilson Lane, Bethesda, Md. (home)
N. P. Breed, Ass't to Administrative Vice President, Harvard University,
Massachusetts Hall, Cambridge, Mass.
John Byrne, Vice President, Airborne Instruments Laboratory,
160 Old Country Rd., Mineola, L.I.
F. C. Cahill, Supervising Engineer, Airborne Instruments Laboratory,
160 Old Country Rd., Mineola, L.I.
Mark E. Campbell, Member of Technical Staff, Bell Telephone Laboratories,
463 West St., N.Y.
P. S. Carter, Research Engineer, RCA Laboratories,
Rocky Point, N.Y.
H. A. Chinn, Chief Audio-Video Engineer, Columbia Broadcasting System, Inc.
485 Madison Avenue, N.Y. 22, N.Y.
Ralph L. Clark, Director, Programs Div., Research & Development Board,
Rm. 3E624, Pentagon Bldg., Washington 25
A. Earl Cullum, Jr., Owner, A. Earl Cullum Consulting Radio Engineers,
Highland Park Villiage, Dallas 5, Texas
Capt. A. J. Detzer, Sub-Board Inspection & Survey, N.Y. Bldg. #3,
10th Floor, NY Naval Shipyard, Bklyn 1, NY
William Dow, Prof. Electrical Engineering, University of Michigan,
Ann Arbor, Michigan
J. N. Dyer, Engineering Supervisor, Airborne Instruments Laboratory,
160 Old Country Rd., Mineola, L.I.
D. T. Ferrier, Ass't to President, Servo Corp. of America
294 N. Fulton Ave., Lindenhurst, L.I.
W. G. H. Finch, President, Finch Telecommunications, Inc.
10 East 40 St., N.Y.
V. Fraenckel, Physicist, General Electric Research Laboratory
1 River Rd., Schenectady, N.Y.
Eugene, Fubini, Supervising Engineer, Airborne Instruments Laboratory,
160 Old Country Rd., Mineola. N.Y.
L. A. Gebhard, Supt. Radio Division II, Naval Research Laboratory,
Washington, D.C.
Cmdr. K. M. Gentry, Chief of Staff, Commander Cruiser Div. 12,
U.S.S. Huntington, c/o F.P.O., N.Y.
G. W. Gilman, Director Transmitter Engineering, Bell Telephone Laboratories,
463 West St., New York, N.Y.
Capt. Roy Graham, U.S.N., Communication Officer Eastern & Gulf Sea Frontier,
90 Church St., N.Y.

George L. Haller, Acting Dean, Pennsylvania State College,
P.O. Box 342, State College, Pa.
D. G. C. Hare, President, Deering Milliken Research Trust,
28 Havemeyer Place, Greenwich, Conn.
D. B. Harris, Executive Ass't to Director of Research, Collins Radio Co.,
Cedar Rapids, Iowa
Hiram D. Harris, Associate Professor, Rensselaer Polytechnic Institute,
Troy, New York
Capt. Chas. F. Horne, U.S.N., Deputy Chief of Naval Communications,
Room 2724, Navy Dept., Washington, D.C.
Melvin L. Jackson, Patent & Sales Engineer, Airborne Instrument Lab.,
160 Old Country Rd., Mineola, N.Y.
H. M. Johnson, Meter Engineer, New England Power Service Company,
441 Stuart Street, Boston 16, Mass.
R. W. Larson, Administrative Ass't to Director of Research, General
Electric Research Lab., Schenectady, NY
Frank D. Lewis, Applications Engineer, General Radio Company,
275 Massachusetts Ave., Cambridge, Mass.
Chas. V. Litton, President, Litton Industries, Inc.
P.O. Box 749, Redwood City, California
R. E. Mathes, Chief Engineer, Gray Research & Development Corp.
15 Fairhill Rd., Westfield, N.J. (home)
C. G. Mayer, European Technical Representative, Radio Corp. of America,
745 Fifth Ave., New York, N.Y.
Gen. Harold McClelland,U.S.A., Commanding General, Headquarters AACS,
Washington, D.C.
J. W. McRae, Director of Electronic & Television Research, BTL,
463 West Street, New York
John Mitchell, Repres. to Bureau Ships, Sperry Syroscope Company,
Great Neck, N.Y.
J. H. Moore, Telephone Engineer, American Telephone & Telegraph Company,
195 Broadway, N.Y.
C. W. Oliphant, Harvard University, 1905 National Bank of Tulsa Bldg.,
Tulsa, Oklahoma
J. M. Pettit, Associate Professor Electrical Engineering Dept.,
Stanford University, Stanford, California
Dr. E. R. Piore, Office of Naval Research, Bureau of Ships, Navy Dept.,
Room 2602T3, Washington, D.C.
L. R. Philpott, Director Research & Development, Finch Telecommunications,
Passaic, N.J.
Richard C. Raymond, Ass't Professor (Physics), Dept. of Physics, Penn. State
State College, Pa.
H. J. Reich, Prof. of Electrical Engineering, Yale University,
161 Thoraton St., Hamden 14, Conn. (home)
H. R. Skifter, President, Airborne Instrument Laboratory,
160 Old Country Rd., Mineola, N.Y.
James, Stokley, Publicity, General Electric Research Laboratory,
Schenectady, N. Y.
Dr. C.G. Suits, Vice President, General Electric Research Laboratory,
Schenectady, N. Y.
F. E. Terman, Dean of Engineering , Stanford University,
Stanford, California
John H. Teeter, Ass't to Executive Vice President, American Cancer Society,
47 Beaver St., New York, N.Y.

D. E. Thomas, Member Technical Staff, Bell Telephone Laboratories, 180 Varick St., New York, N.Y.
Orrin Towner, Technical Director, WHAS, Inc. Anchorage, Kentucky

2. Cocktails

Cocktails were served at 6:15 p.m.

3. Dinner

Dinner was served at 7:00 p.m.

4. Meeting

The chairman called the meeting to order at 8:15 p.m. The Agenda distributed prior to the meeting was followed.

Major General Harold M. McClelland, Commanding General of the Army Airways Communications System, gave an exceedingly interesting talk, illustrated with slides, on the Air Communications problems.

Commander C. G. Mayer (USNR) advised that the first British RCM Annual Reunion was held recently and a second one is planned for November 5, 1948. He suggested that a message of greeting be addressed to Air Vice Marshall Addison, Air Ministry, Whitehall, London, in time for their next meeting.

The program was concluded by those present briefly describing their present activities.

5. Adjournment

The meeting adjourned about 11 p.m.

Howard A. Chinn
Secretary

Distribution - (a) To those listed in (1) above and (b) the following absentees:

H. W. Albrecht, Northwestern Bell Telephone Co., Minneapolis, Minn.
M. L. Almquist, Bell Telephon Laboratories, 463 West St., N.Y. 14
S. L. Bailey, Jansky & Bailey, National Press Bldg., Washington, D.C.
George Bailie, RAF Station, Walton, Norfold, England
H. H. Benning, Aircraft Radio Corp., Boonton, N.J.
R. J. Bowley, Philco Radio & Television, Philadelphia, Pa.
Ralph Bown, Bell Telephone Laboratories, Murray Hill, N.J.
Robert Brandt, New England Power Service Co., 441 Stuart St., Boston 16, Mass.
W. N. Brown, Jr., Pennsylvania State College, P.O. Box 342, State College, Pa.
Dr. V. Bush, Carnegie Institution, 1530 P. Street NW, Washington 5, D.C.
A. B. Clark, Bell Telephone Laboratories, 463 West Street, N.Y. 14
Dr. Karl T. Compton, Massachusetts Institute of Technology, Cambridge, Mass.

Dr. James B. Conant, Harvard University, Cambridge, Mass.
Capt. R. D. Conrad, Brookhaven National Laboratory, Upton, N.Y.
Dr. L. A. DuBridge, President, California Institute of Technology, Pasadena, Cal.
W. W. Farley, Collins Radio Co., 321 Third St., S.E., Cedar Rapids, Iowa
John V. L. Hogan, Faximile, Inc. 730 Fifth Avenue, N.Y.
J. Holey, 702 North Douty Street, Hanford, California
Dr. Albert W. Hull, Research Laboratory, General Electric Co., Schenectady, NY
C. M. Jansky, Jansky & Bailey, National Press Bldg., Washington, D. C.
Frank B. Jewett, Short Hills, N.J.
Dr. C. B. Jolliffe, RCA Laboratories, Princeton, N.J.
Ralph A. Krause, Massachusetts Institute of Technology, Cambridge, 39, Mass.
J. J. Livingood, Collins Radio Co., 321 Third St., S.E., Cedar Rapids, Iowa
R. D. Martin, Airborne Instruments Laboratory, 2627 N. Hollywood Way Hanger 3, Burbank, Calif.
Dean Edward Moreland, Jackson & Moreland, 31 St. James Ave., Boston 16, Mass.
R. K. Potter, Bell Telephone Laboratories, Murray Hill, N.J.
L. N. Ridenour, University of Illinois, Urbana, Ill.
W. W. Salisbury, Collins Radio Company, Cedar Rapids, Iowa
J. C. Schelleny, Bell Telephone Laboratories, Deal, N.J.
Dr. S. Paul Shackleton, Bell Telephone Laboratories, 463 West St., N.Y. 14
Don Sinclair, General Radio Co., Cambridge, Mass.
L. C. Smeby, 4801 Connecticut Avenue, NW. Washington 8, D.C.
R. A. Soderman, General Radio Co., Cambridge, Mass.
J. H. Sole, Office of Scientific Research & Development, Washington, D.C.
Dr. Irvin Steward, University of W. Virginia, Morgantown, W. Virginia
Julian M. West, Bell Telephone Laboratories, Murray Hill, N.J.
Carroll L. Wilson, General Manager, Atomic Energy Commission, 1901 Constitution Avenue, Washington 25
Norman Winter, Research & Development Board, Pentagon, Room 3E635, Washington,DC
Colonel H. R. Yeager, Mitchell Field, Brooklyn, N.Y.

4/9/48

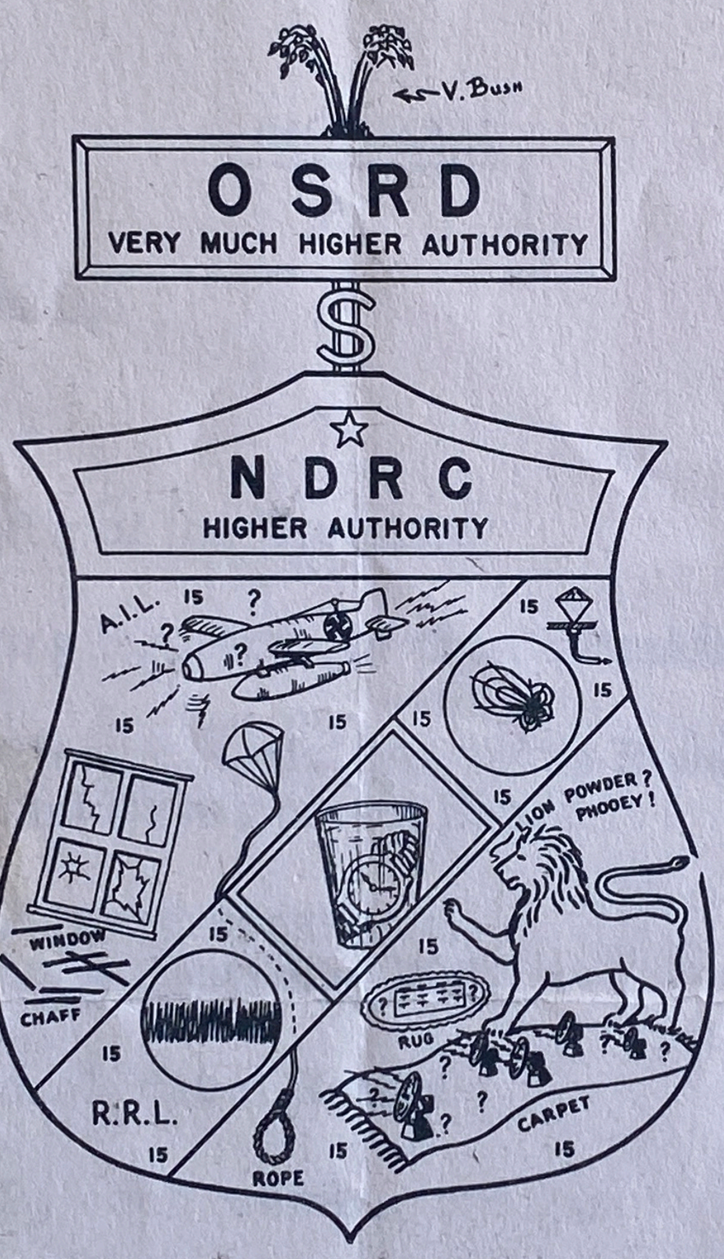
file - Post War
Div 15.

PRESS RELEASE

ASSOCIATION OF OLD CROWS

February 23, 1955

(For immediate release)



SEVENTH ANNUAL REUNION

Postwar Division 15 -- NDRC

March 6, 1952

WILLIAMS CLUB, NEW YORK

PROGRAM

6:00 Cocktails

7:00 Dinner

8:00 Meeting of the Division:

Opening Remarks by the Chairman

"Electronic Activities of the Research and Development Board."

Edward Speakman,
Vice Chairman RDB

Personal Status Report

By each member and guest

(Time limit - 1 minute per person)

BULL SESSION

.....

Music by Don Harris

PRESS RELEASE

ASSOCIATION OF OLD CROWS

February 23, 1955

Mr. Melvin L. Jackson
Vice President, C.G.S. Laboratories, Inc.
391 Ludlow Street
Stamford, Connecticut

Dear Mel:

I note with interest your move to a new job, and will be looking forward to hearing about it at the Division 15 reunion.

My regards to Molly.

Very truly yours,

F. E. Terman
Dean

FET:bw

CGS LABORATORIES, INC.

file - Division 15.

PRESS RELEASE

ASSOCIATION OF OLD CROWS

(For immediate release)

The founding of The Association of Old Crows for those interested in countermeasures has been announced by Mr. Melvin L. Jackson, Vice President of CGS Laboratories, Inc., developers and manufacturers of electronic equipment in Stamford, Connecticut.

The name of the group was derived from the code word Raven. Raven was used in World War II as a synonym for countermeasures. It has since been modified to Crow by countermeasures old-timers referring to themselves as Old Crows.

During World War II Electronic Countermeasures (ECM) grew from an insignificant beginning into an activity that played a major part in shortening the conflict by jamming the enemy's radio communications and radar systems. Those who were instrumental in this and those who participated in the various programs take great pride in having been associated with the work and with each other. Many others entering the field since then have quickly come to feel the same pride and cohesive spirit that exists throughout the group.

It is in recognition of this esprit de corps that the Association of Old Crows has been established. A pocket coin the size of a silver dollar has been designed having a black raven with red lightning bolts in its claws with the word "countermeasures" above it on one side and the Association name on the other. This was adopted for identification rather than a pin because it can be used by uniformed personnel as well as civilians. This may also be cast in clear plastic to form a distinctive paper weight. No formal organization of the group is planned at this time.

Anyone who is now or previously has been genuinely active in planning, directing, developing or operating countermeasures programs, equipment or techniques is invited to become a member of the Association. Registration cards are available from members who will be glad to issue them to those just described. Further information may be had from Old Crow Headquarters, CGS Laboratories, Inc., 391 Ludlow Street, Stamford, Conn.

CGS LABORATORIES, INC.
391 Ludlow Street, Stamford, Connecticut

№ 137

REGISTRATION IN THE ASSOCIATION OF OLD CROWS

Mailing address for Old Crow Coin:

Check box if more cards like this are wanted ☐ How many? _____

Make out a check for $2 to The Association of Old Crows to register and get your Old Crow Coin, and send it with this card to:

OLD CROW HEADQUARTERS
CGS LABORATORIES, INC.
391 Ludlow Street
Stamford, Conn.

J. C. LIND
FH
ITT HOLLINGER C
AFFILIATED
ROUTE 25A, S

POST-WAR DIVISION 15 NDRC

D-
File Div. 15
MAR 4 1957

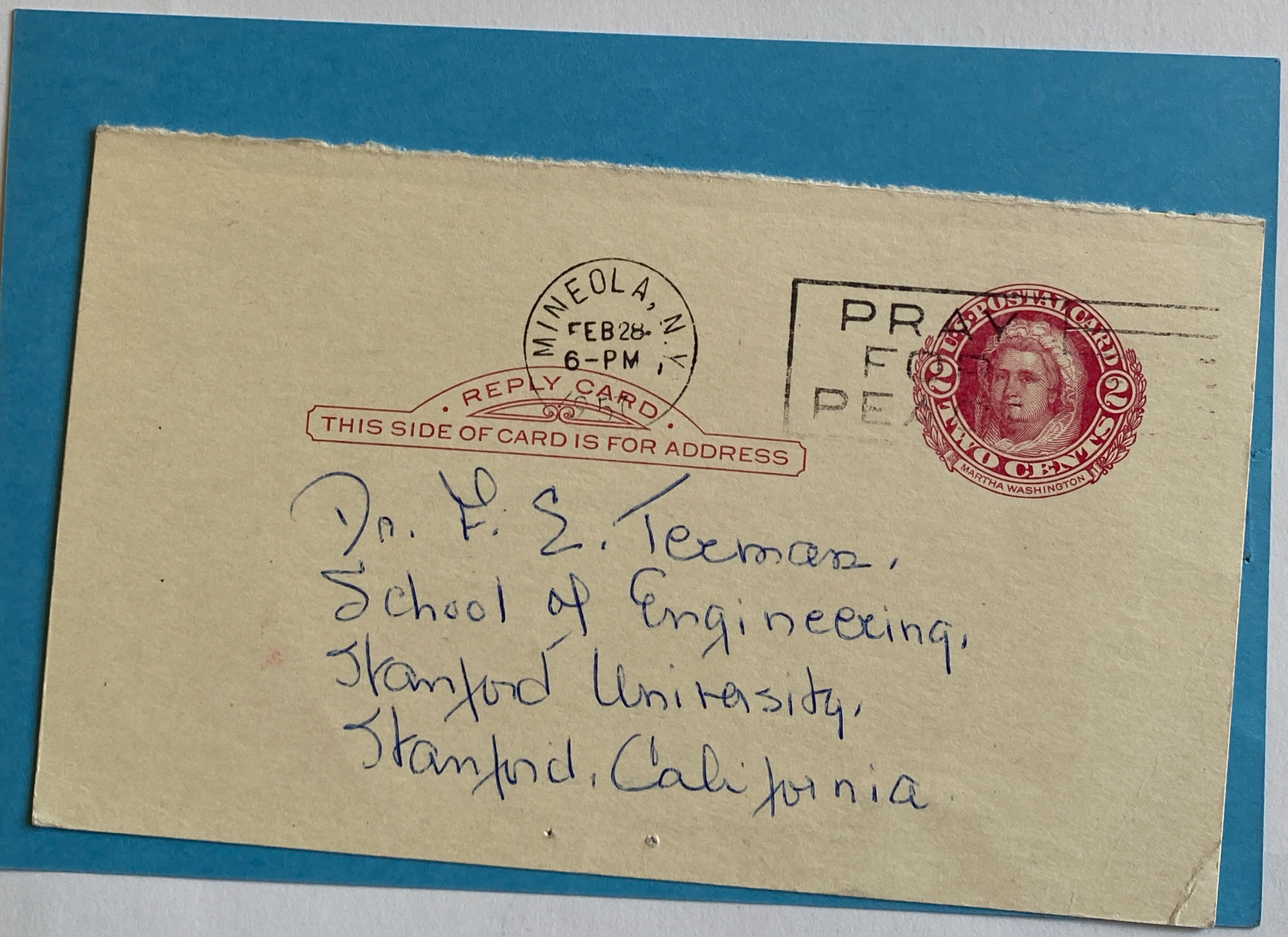
Dear Jammer:

In accordance with the plans previously announced, the Twelfth Annual Reunion will be held Thursday, March 21, at the Williams Club, 24 East 39 Street, New York City, with cocktails at six and dinner at seven. Rear Admiral Rawson Bennett, Chief, Office of Naval Research, USN, will speak on MEASURES, COUNTERMEASURES, AND COSTS - the Interrelationship of things electronic.

Please return the attached card promptly to me, advising whether you will be present. We sincerely hope you will be there.

Cordially yours,
Hector R. Skifter

March 1, 1957
Airborne Instruments Laboratory
Mineola, Long Island, N. Y.


MINEOLA, N.Y.
FEB 28
6-PM
REPLY CARD
THIS SIDE OF CARD IS FOR ADDRESS
U.S. POSTAL CARD
TWO CENTS
MARTHA WASHINGTON
Dr. F. E. Terman,
School of Engineering,
Stanford University,
Stanford, California.

POST WAR DIVISION 15 NDRC

Div 15.

FEB 11 1957

Dear Jammer:

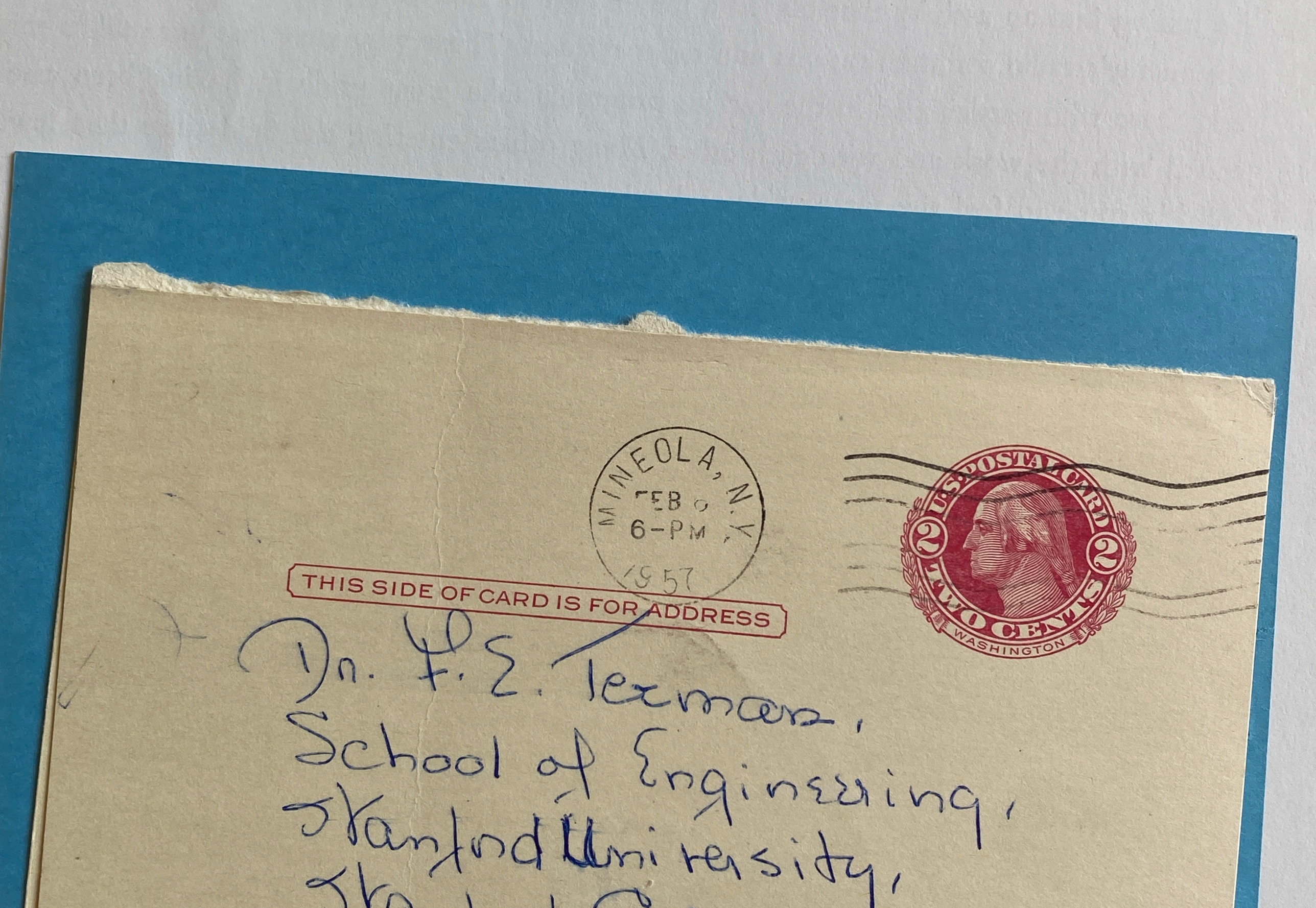
The Twelfth Annual Reunion of the members of Post-War Division 15 will be held Thursday evening, March 21, 1957, at the Williams Club, 24 East 39th St., New York, N. Y., with cocktails at six and dinner at seven o'clock. This date is the last day of the IRE Convention. Rear Admiral Rawson Bennett, Chief, Office of Naval Research, ONR, will be our speaker.

Please mark this date on your calendar. We will send out a second notice with a return post card about March 1st.

5 February, 1957
Airborne Instruments Laboratory
Mineola, L. I., N. Y.

Cordially yours,

Hector R. Skifter


MINEOLA, N.Y.
FEB
6-PM
1957
THIS SIDE OF CARD IS FOR ADDRESS
U.S. POSTAL CARD
2
TWO CENTS
WASHINGTON
Dr. F. E. Terman,
School of Engineering,
Stanford University,
Stanford, California.

CGS *Laboratories, inc.*

ANNOUNCES THAT

MR. MELVIN L. JACKSON

HAS JOINED THE CORPORATION AS

VICE PRESIDENT

391 LUDLOW STREET
STAMFORD, CONNECTICUT
TELEPHONE: DAVIS 4-9508

JANUARY 24, 1955

Stanford University Archives
SC 160 SERIES I
Box 3

Post-War Files:
Office of Scientific Research and Development
1946-47

OFFICE FOR EMERGENCY MANAGEMENT

OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT

1530 P STREET NW.

WASHINGTON 25, D. C.

VANNEVAR BUSH
Director

April 12, 1946

Dr. F. E. Terman
Department of Electrical Engineering
Stanford University
Palo Alto, California

Dear Dr. Terman:

In connection with the wish of OSRD to return to conventional peace-time practice, Dr. Bush has asked me to write you in his behalf.

In preparation for the proposed move, we have asked Division Chiefs to give us lists of persons qualified to act as referees in the sense of Section C of the attached Administrative Circular.

We have forwarded these lists to the editors of all responsible scientific and engineering journals with a letter, copy of which is attached. You will note that the journals are not compelled to refer articles to any of the referees nor, obviously, is any referee bound to accept the responsibility of refereeing.

If everyone cooperates, however, we are confident that no one will find the task onerous. We hope, therefore, that you will serve as the occasion arises and on such terms as may be mutually agreeable to the journal and yourself. In so doing, you can help to bring to a fitting close your many contributions to the success of OSRD over the past five years.

Sincerely yours,

John E. Burchard

John E. Burchard
Chairman, Committee on Publications

Attached:
Copy of Revised Administrative Circular 2.03
Copy of letter to publishers
Copy of referee list

19-166

OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT

VANNEVAR BUSH
Director

April 26, 1946

Mr. John E. Burchard
Chairman, Committee on Publications
Office of Scientific Research and Development
1530 P Street, N. W.
Washington 25, D. C.

Dear Mr. Burchard:

When asked to do so, I will be quite happy to serve as a referee as outlined in Section C of the Administrative Circular.

I am glad to note that OSRD has a continuing system worked out. It appears to be a very satisfactory program.

You apparently have my old address on your records. My present address is:

Dr. F. E. Terman, Dean
School of Engineering
Stanford University
California

Yours very truly,

F. E. Terman
Dean

FET:hl

OFFICE FOR EMERGENCY MANAGEMENT
OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT
1530 P STREET NW.
WASHINGTON, D. C.

VANNEVAR BUSH
Director

April 16, 1946 REFER: SO:IBG

Dr. F. E. Terman
Radio Research Laboratory
Harvard University
18 Divinity Avenue
Cambridge 38, Mass.

Dear Dr. Terman:

Reference is made to my letter of March 28, 1946 which asked you to send in the certification requested in Mr. Norcross's letter of January 25.

It will be appreciated if you will give this matter your attention in order that your file may be closed.

Very truly yours,

Lee Anna Embrey

Lee Anna Embrey
Administrative Officer

OFFICE FOR EMERGENCY MANAGEMENT
OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT
1530 P STREET NW.
WASHINGTON, D. C.
Zone 25

April 29, 1946

Miss Lee Anna Embrey
Administrative Officer
Office of Scientific Research and Development
1530 P Street N. W.
Washington 25, D. C.

Dear Miss Embrey: REFER: SO:IBG

Reference is made to your letter of April 16 in connection with certification of documents. This letter and also your former letters were forwarded to me from Cambridge, Massachusetts.

In accordance with the suggestion contained in your letter of March 28, I signed the appropriate statement in the bottom of the letter and returned it to you early this month. It should be in your hands by this time, but if not I would suggest that you send me another copy of the March 28 letter on which I will execute the statement and return to you.

Yours very truly,

F. E. Terman
Dean

FET:hl
cc: Miss Mudge

OFFICE FOR EMERGENCY MANAGEMENT

OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT

1530 P STREET NW.
WASHINGTON, D. C.

VANNEVAR BUSH
Director

Zone 25

Ref:F:CBW

March 25, 1946

Professor Frederick E. Terman
Radio Research Laboratory
155 Massachusetts Avenue
Cambridge, Massachusetts

Dear Profe-

W
OSRD te

We
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covered

Tra
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We know t
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bill in th
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request OSR
was apparen
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your earlies
Pullman tick
voucher toge
secure a refu
celled ticket
of.

The blue
identificatio
shown on your
submitted to M
1530 P Street N

Dr. Terman:

One white and two yellow copies should be sent on to Washington. The third copy is for your files.

Under your signature I have typed a current date and your title as of the time when the TR was in effect. Mr. Breed and Mr. Albrecht assure me that this is all right!

E.M.

Dr Terman:
Note

es as WOC Appointee for

itability record and note since August 1944, which

was included in a book
ounted for on a voucher.
urchase a single bedroom
se we have received a
ich has been paid. You
you used transportation
ston to Washington, which
that a voucher report-
7173 be submitted at
possession a cancelled
submit it with the
st, we will be able to
do not have the can-
ent for the cost there-

4075 and your picture
rned and are still
rticles should be
Property Clerk, Room 101,
ton, D. C. without delay.

Very truly yours,

C. G. Cruikshank
Budget and Finance Officer

By: Mae R. Magee
Mae R. Magee
Special Assistant

OFFICE FOR EMERGENCY MANAGEMENT

OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT

1530 P STREET NW.

WASHINGTON, D. C.

VANNEVAR BUSH
Director

Zone 25

Ref:F:CBW

March 25, 1946

Professor Frederick E. Terman
Radio Research Laboratory
155 Massachusetts Avenue
Cambridge, Massachusetts

Dear Professor Terman:

We have been informed that your services as WOC Appointee for OSRD terminated on January 3, 1946.

We are endeavoring to clear your accountability record and note that you have not submitted a travel voucher since August 1944, which covered the period from August 1 to 12.

Transportation request OSRD-47173, which was included in a book issued to you on May 15, 1944, has not been accounted for on a voucher. We know that this request was used by you to purchase a single bedroom from Boston to New York on July 1, 1944, because we have received a bill in that amount from the Pullman Company which has been paid. You have rendered a voucher to show that on July 1 you used transportation request OSRD-47172 for a double bedroom from Boston to Washington, which was apparently used on July 11. It is necessary that a voucher reporting the use of transportation request No. OSRD 47173 be submitted at your earliest convenience. If you have in your possession a cancelled Pullman ticket purchased on this request and will submit it with the voucher together with the white copy of the request, we will be able to secure a refund from the Pullman Company. If you do not have the cancelled ticket you will be indebted to the Government for the cost thereof.

Dr Terman's note

The blue travel identification card No. OEM-4075 and your picture identification card No. 14-3344 have not been returned and are still shown on your record as outstanding items. These articles should be submitted to Mrs. C. B. Wagner, Accountable Property Clerk, Room 101, 1530 P Street N.W., Washington, D. C. without delay.

Very truly yours,

C. G. Cruikshank
Budget and Finance Officer

By: Mae R. Magee
Mae R. Magee
Special Assistant

Standard Form No. 1012a--Revised
FORM APPROVED BY
COMPTROLLER GENERAL, U. S.
July 19, 1937 (Amended Oct. 30, 1942
General Regulations No. 35

VOUCHER FOR PER DIEM AND/OR REIMBURSEMENT OF EXPENSES INCIDENT TO OFFICIAL TRAVEL

D. O. Voc. No. _____
Bureau No. _____

U. S. Office of Scientific Research and Development
(Department, Bureau, or establishment)

THE UNITED STATES, Dr.,

To Frederick E. Terman, Cambridge, Mass.

Address: Radio Research Laboratory
Division Avenue
Cambridge 42, Mass.
(Official Headquarters) (Residence (for use in travel (service only)))

PAID BY

April 24, 1946

Your Ref: F:CBW
(For use of Paying Office)

FOR PER DIEM in lieu of subsistence, mileage for privately owned motor vehicle, and/or REIMBURSEMENT of travel and other expenses paid by me in the discharge of official duty from _____, 19__ to _____, 19__, by _____ authority No. _____, dated _____, copy of which is attached, as follows:

	AMOUNT	
	Dollars	Cents
(Space for entries, if any, in this space)		
Difference		
Account verified correct for _____	$	
(Signature or initials)		

Mr. C. G. Cruikshank
Budget and Finance Officer
Office of Scientific Research and Development
1530 P Street NW
Washington 25, D. C.

Atten: Mae R. Magee

Dear Sir:

I have your letter of March 25 addressed to Dr. F. E. Terman. Referring to the third paragraph of that letter, I do have the cancelled Pullman ticket and the white copy of TR 47,173. I am sending these, together with the necessary voucher, to Dr. Terman, who is now at Stanford University, California. After signing the voucher, he will no doubt send the material directly to you.

I shall also call to his attention the final paragraph of your letter concerning identification cards.

Very truly yours,

Secretary to Dr. Terman

ACCOUNTING CLASSIFICATION (For completion by administrative office)

Appropriation, Limitation or Project Symbol	Appropriation Title	Limitation or Project Amount	Apportionments Amount
		$	$

Allotment Symbol	Amount	Obligations Liquidated	Cost Account Symbol	Cost Account Amount	Object Classification Symbol	Object Classification Amount
	$			$		$

Paid by { Check No. _____, dated _____, 19__, for $_____ } on Treasurer of the United States in favor of payee named above.
{ Cash, $_____, on _____, 19__ }

*If there was no prior authority state circumstances which rendered obtaining prior authority impracticable.

Standard Form No. 1012a—Revised
FORM APPROVED BY
COMPTROLLER GENERAL, U. S.
July 19, 1937 (Amended Oct. 30, 1942
General Regulations No. 88

VOUCHER FOR PER DIEM AND/OR REIMBURSEMENT OF EXPENSES INCIDENT TO OFFICIAL TRAVEL

D. O. Vou. No. _____
Bureau No. _____

U. S. Office of Scientific Research and Development OSRD
(Department, bureau, or establishment)

THE UNITED STATES, Dr.,

To Frederick E. Terman, Member, Div. 15, NDRC

Address: Radio Research Laboratory
Divinity Avenue
Cambridge 38, Mass.
(Official Headquarters) (Residence (For use of Postal Service only))

PAID BY

(For use of Paying Office)

FOR PER DIEM in lieu of subsistence, mileage for privately owned motor vehicle, and/or REIMBURSEMENT of travel and other expenses paid by me in the discharge of official duty from ~~[illegible] on July 23-24~~, 19 44, to _____, 19_____, as per itemized statement within, under authority No. _____, dated Nov. 1, 1943, 19_____, copy of which is attached,* or has been previously furnished with voucher No. 517-44, paid _____, 19_____, by _____
(Name of disbursing officer)

AMOUNT	
DOLLARS	CENTS
$	

(Payee will NOT use this space)

Differences _____

Account verified correct for _____ $

(Signature or initials) _____

false claims are known to me and the penalties for

April 28,1946 Member, Div.15, NDRC

MEMORANDUM

The next previous voucher paid under the same travel authority was: D. O. Vou. No. _____, paid _____
(Date)

ACCOUNTING CLASSIFICATION (For completion by administrative office)

APPROPRIATION, LIMITATION OR PROJECT SYMBOL	APPROPRIATION TITLE	LIMITATION OR PROJECT AMOUNT	APPROPRIATION AMOUNT
		$	$

ALLOTMENT SYMBOL	AMOUNT	OBLIGATIONS LIQUIDATED	COST ACCOUNT		OBJECTIVE CLASSIFICATION	
			Symbol	Amount	Symbol	Amount
	$			$		$

Paid by { Check No. _____, dated _____, 19_____, for $_____ } on Treasurer of the United States in favor of payee named above.
{ Cash, $_____, on _____, 19_____ }

SIGN ORIGINAL ONLY

_____
(Signature of payee)

*If there was no prior authority state circumstances which rendered securing prior authority impracticable.

16—23954-2

STATEMENT OF TRAVEL PERFORMED FOR WHICH REIMBURSEMENT IS NOT CLAIMED BY TRAVELER

DATE OF TRAVEL	NO. OF TRANSPORTATION REQUEST OR SPEEDOMETER READING	FROM—	TO—	VIA* (Kind of carrier or vehicle; also abbreviated name of the carrier)	CLASS OR MILEAGE†	AMOUNT
7/24/44	47173*	Boston	New York	Pullman	Single Bedroom	$5.25

* Cancelled because New York meeting postponed.

*Railroad, steamship, airplane, bus, etc.
†Abbreviate class of service or accommodations used. Railroad: F, first class; I, intermediate class; M, mixed class; C, coach; P, Pullman accommodations; DR, drawing room; CP, compartment; BR, bedroom; SOS, single occupancy section; SEC, section; LB, lower berth; UB, upper berth; S, seat. By other mode: Number of miles traveled.

OFFICE FOR EMERGENCY MANAGEMENT
OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT
1530 P STREET NW.
WASHINGTON 25, D. C.

VANNEVAR BUSH
Director

April 29, 1946

Mr. C. G. Cruikshank
Budget and Finance Officer
Office of Scientific Research and Development
1530 P Street, N. W.
Washington 25, D. C.

Attention Mae R. Magee

Dear Sir:

With reference to your letter of March 25, Ref:F:CBW,
I am enclosing herewith the cancelled Pullman accomodations
and the transportation request OSRD-47173, and travel statement

I am also enclosing my identification for government
transportation and also my picture identification card,
as you requested.

Yours very truly,

F. E. Terman
Dean

FET:hl
cc: Miss Mudge

Sincerely yours,

John E. Burchard, Chairman
Committee on Publications

Attachments:
As listed above.

OFFICE FOR EMERGENCY MANAGEMENT

OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT

1530 P STREET NW.

WASHINGTON 25, D. C.

VANNEVAR BUSH
Director

Attached please find:

1. Copy of Revised Administrative Circular 2.03 to all NDRC personnel concerned, dealing with our new policy regarding unofficial publication.

2. List of potential referees as mentioned in Section C.

3. Copy of typical letter which has been sent to each of the potential referees.

It is to be noted that the journal is under no compulsion to use any referee from this list; nor can we guarantee that any particular person in the list will consent to referee. In view, however, of the excellent past record of the refereeing system and the experience of the men on the list, it is believed that you will readily be able to work out a mutually helpful procedure.

Sincerely yours,

John E. Burchard, Chairman
Committee on Publications

Attachments:
As listed above.

OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT
1530 P Street, N. W.
Washington 25, D. C.

Office of the Executive Secretary

ADMINISTRATIVE CIRCULAR 2.03 (REVISION I)

Effective Date: April 15, 1946

SUBJECT: REVISED PROCEDURE FOR PUBLICATION OF SCIENTIFIC INFORMATION RELATING TO NDRC-OSRD WORK*

Effective immediately the Office of Scientific Research and Development will cease to review proposals for publication of information of a popular or a technical nature (except for its official publications, reports, Summary Technical Report's, monographs and the OSRD history) and will no longer assist in the clearance of non-official papers for publication. Hereafter, the Committee on Publications, OSRD, will serve solely as an advisory committee to the Director of OSRD. Correspondence or inquiries concerning publication of scientific information (other than requests for security clearance) should be addressed to the Executive Secretary, OSRD. For the purposes of this circular "publication" refers to (i) any printed or reproduced document containing information intended for public consumption or (ii) the act of disclosing information to the public by means of press release, journal article, advertisement or speech.

This circular is intended to outline the procedure to be followed hereafter, by authors requiring security clearance for publication of papers based on the results of work performed in whole or in part under OSRD-NDRC contracts.*

I. PROCEDURE FOR PUBLICATION OF INFORMATION UNDER NDRC-OSRD CONTRACTS

In accordance with this revised policy, the author(s) himself must secure the necessary security clearances for publication, as a private individual, except that in cases where an OSRD contract employee is still in the employ of the OSRD contractor under whom the work was conducted, the contractor may secure the necessary clearances. In carrying out this policy, the following principles and procedure should be observed:

A. Use of Government Time

No person should use time for which he is compensated directly or indirectly by the Government in preparing, negotiating publication of, or securing clearance for, any non-official paper.

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* This procedure will apply equally to other organizational segments (except CMR) directly under OSRD. For CMR procedure, see Committee on Medical Research memoranda CMR-21, CMR-22 and CMR-26.

B. Use of Official Documents

OSRD reports are official documents, which, regardless of security classification, are not to be submitted in toto, in verbatim excerpt, or in form approximating either of these for publication as an unofficial paper or article. When declassified, official OSRD reports are sent to the Office of the Publication Board, Department of Commerce, from which microfilm or photostatic copies may be purchased.

C. Accuracy of Statements

All checks on accuracy of statement are solely the responsibility of the author(s) and publisher. To assist in checking technical papers, the OSRD has placed in the hands of the editors of technical journals a list of former OSRD employees/appointees competent to referee papers in various fields. The use of these referees is optional with the journals, and the rendering of service by the referees is optional with each of them individually. Referees should not be expected to go beyond the usual responsibility of referees, nor should they be asked to make any inquiry or determination concerning military security.

D. Credits

Authors preparing papers for publication should observe normal precaution in assuring that fair credit is given to fellow workers and to work done by other OSRD contractors and by our Allies. The paper should also contain a footnote describing the relation of the article to work done under contract with the Office of Scientific Research and Development, as follows:

> "This paper is based in whole or in part on work done for the Office of Scientific Research and Development under Contract (OSRD Contract No.) with (OSRD Prime Contractor)."

Referees may be requested to comment upon distribution of credit within the scope of their personal knowledge.

E. Clearance of Classified Information for Publication

Article 6(a) "Security Provisions" of the OSRD Standard Form Contract provides that no disclosure of information concerning an OSRD contract or obtained as a result of the performance of a contractor's undertakings under the contract may be made to others than employees assigned

to contract work without the written consent of the OSRD Contracting Officer or the Scientific Officer. Henceforth, if an article proposed for publication contains information from a classified OSRD report or concerning a classified OSRD contract or the subject work thereof, clearance for such article shall be secured directly from the Army or Navy* instead of from the OSRD Contracting Officer as previously required. Normally, security clearance by both Army and Navy will be required. However, where it is definitely known that one of the two Services has absolutely no interest in the particular work, clearance with the interested Service only will suffice. If there is any uncertainty, both Services should be consulted.

F. Security Precautions

The full responsibility for determining the necessity for security clearance and for obtaining it in advance of publication rests with the author(s) or his employer (if an OSRD contractor) and the publisher. Any unauthorized or improper disclosures of classified information will render those responsible criminally liable under the security laws and regulations of the Federal Government.

Whenever an OSPD contract or contractor's report is declassified, the contractor's business representative is expressly notified by the OSRD Contracting Officer. In the absence of such notice it is inadvisable to publish without Army and/or Navy clearance.

Any description or reference in the text or illustrations which touches upon the military application or integration of the subject matter in a program or operational use or current design will impede Army/Navy clearance. If care is exercised to avoid such references, clearance will be more readily possible.

Except in the case of publications cleared by the Army and/or Navy as herein provided, disclosures concerning classified OSRD contracts or the subject work thereof shall continue to require the approval of the Scientific or Contracting Officer designated in the OSRD contract.

G. Patent Precautions

Publications must not contain expressions involving the dates of solutions of problems which are phrased in a way to indicate an invention to have been completed on a specified date.

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* Service clearance contacts: Army--Review Branch, Bureau of Public Relations, War Department, Pentagon, Washington 25, D. C.; Navy--Office of Chief of Naval Operations, Navy Member, Committee on Release of Scientific Information, Navy Department, Washington 25, D. C.

II. CONFLICT WITH OFFICIAL OSRD PUBLICATIONS

To avoid inadvertent publication of any article, paper or book which would conflict with or duplicate any of the scheduled official publications of the Office of Scientific Research and Development which are to be published commercially through private channels, the titles and publishers of these books are listed in Attachment I of this circular.

Cleveland Norcross
Acting Executive Secretary

DATE: April 11, 1946

NOTE: This circular supersedes Administrative Circular 2.03, "Publication of Scientific Information Relating to NDRC-OSRD Work," dated August 18, 1945; and Administrative Circular 2.03, Supplement I, "Supplementary Method for the Clearance of Articles Related to NDRC-OSRD Work Proposed for Publication," dated dated December 20, 1945, and OSRD Memorandum No. 133 and its Supplement No. I.

Circular Distribution

1. All OSRD-NDRC Contractors
   a. Business Representatives
   b. Technical Representatives

2. Office of Scientific Research and Development
   a. Office of the Director
      1. Scientific Personnel Office
   b. Office of Field Service
   c. Office of the Executive Secretary
      1. F. J. Newman
      2. Maxwell P. Zide
   d. Liaison Office
   e. Section T

3. National Defense Research Committee
   a. NDRC Members
   b. Office of the Chairman
      1. Engineering and Transition Office
   c. Division, Panel Chiefs and Deputy Chiefs, and Chairmen of Special Committees
   d. Section Chiefs
   e. Division, Panel and Section Members and Members of Special Committees
   f. Technical Aides, Special Assistants and Administrative Assistants

4. Committee on Medical Research
   a. CMR Members (for information)
   b. Office of the Chairman (for information)

5. War Department Liaison Officer (10)

6. Office of Research and Inventions, Navy Department (10)

7. Office of Publication Board (6)

8. Navy Liaison Officer, Publication Board

LIST OF OSRD PUBLICATIONS

I. HISTORIES

A. Short History, "Scientists Against Time." Publisher: Little, Brown & Co.
8 Arlington Street
Boston, Massachusetts

B. Long Histories

DIVISION	VOLUME	TITLE	PUBLISHER
1,2,3,18	I	Ordnance and Metallurgy	Little, Brown & Co.
4,5,7,Sec. T	II	New Weapons for Air Warfare	Little, Brown & Co.
8,9,10,11,19 TDAC, QMCPC	III	Chemistry in World War II	Little, Brown & Co.
16,17,LMC	IV	Optics and Applied Physics in World War II	Little, Brown & Co.
14,VTDC	V	Radar	Little, Brown & Co.
13,15,COP	VI	Electronics Warfare	Little, Brown & Co.
6	VII	Sub-Surface Warfare	Little, Brown & Co.
APP	VIII	Applied Psychology in World War II	Little, Brown & Co.
OFSNALOC (DOLOC)	IX	Combat Scientists	Little, Brown & Co.
Admin. Div., OSRD	X	Organizing Scientific Research for War	Little, Brown & Co.
CMR,ICC,CSD	XI, XII	Advances in Military Medicine	Little, Brown & Co.

II. MONOGRAPHS

DIVISION	TITLE	PUBLISHER
3	Mathematical Theory of Rocket Flight (George Washington University)	McGraw-Hill Book Co., Inc. 330 West 42nd Street New York, New York
3	The Interior Ballistics of Solid Propellant Rockets (California Institute of Technology)	McGraw-Hill Book Co., Inc.
3	The Exterior Ballistics of Fin Stabilized and Spin Stabilized Rockets; with an Appendix on Metric Photography (California Institute of Technology)	McGraw-Hill Book Co., Inc.

DIVISION	TITLE	PUBLISHER
14 (Radiation Laboratory)	Components Handbook	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Vacuum Tube Amplifiers	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Waveforms	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Electronic Instruments	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Cathode Ray Tubes	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Cathode Ray Tube Display Circuits	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Microwave Receivers	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Crystal Rectifiers	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Threshold Signals in Interference	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Propagation of Short Radio Waves	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Principles of Microwave Circuits	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Microwave Transmission Circuits	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Technique of Microwave Measurements	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Microwave Duplexers	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Microwave Magnetrons	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Pulse Generators	McGraw-Hill Book Co., Inc.

DIVISION	TITLE	PUBLISHER
14 (Radiation Laboratory)	Low-Power Microwave Tubes	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Microwave Mixers	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Microwave Antenna Theory and Design	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Theory of Guided Waves	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Automatic Control Systems	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Waveguide Handbook	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Computing Mechanisms and Linkages	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Elements of Radar Systems Engineering	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Radar Navigation and Traffic Control	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	General Index	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Radar Beacons	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Loran	McGraw-Hill Book Co., Inc.
14 (Radiation Laboratory)	Radar Scanner Engineering	McGraw-Hill Book Co., Inc.
15 (Radio Research Lab.)	Very High Frequency Techniques	McGraw-Hill Book Co., Inc.
Committee On Medical Research	Survey of Antimalarial Drugs - 1941-1945	J. W. Edwards, Publishers Ann Arbor, Michigan
Applied Mathematics Panel	Sampling Inspection	McGraw-Hill Book Co., Inc.
Applied Mathematics Panel	Studies in Applied Statistics	McGraw-Hill Book Co., Inc.

LENGEND

ADMIN. DIV. - Administrative Division, OSRD

AMP - Applied Mathematics Panel

APP - Applied Psychology Panel

CMR - Committee on Medical Research

COP - Committee on Propagation

CSD - Committee on Sensory Devices

ICC - Insect Control Committee

LMC - Land Mines Committee

NALCC(DOLCC)- Navy Locator Committee

OFS - Office of Field Service

QMCPC - Quartermaster Corps Problems Committee

TDAC - Tropical Deterioration Administrative Committee

VTDC - Vacuum Tube Development Committee

REFEREE LIST

Office of Scientific Research and Development

1530 P Street, N. W.

Washington 25, D. C.

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PHYSICS

HEAT

Heat Conduction

Dr. J.K.L. MacDonald
Cooper Union for Advancement of
Science and Art
New York, N. Y.

Thermodynamic Properties of Air and Its Constituents

Dr. John G. Aston
Pennsylvania State College
State College, Pa.

Dr. B. F. Dodge
Yale University
New Haven, Connecticut

Dr. Serge Gratch
University of Pennsylvania
Philadelphia, Pa.

Infrared and Ultraviolet Topics in General

Dr. R. C. Lord
Department of Chemistry
Johns Hopkins University
Baltimore, Maryland

Infrared Detection of Gases - Fuel Quantity Gauge

Dr. C. B. Bazzoni
Sun Oil Geophysical Laboratory
Norwood, Pa.

OPTICS (including ultraviolet)

Metric Photography of Projectiles

Prof. I. Bowen
Mount Wilson Observatory
813 Santa Barbara Street
Pasadena 4, California

Photo Electric Fuzes

Dr. A. V. Astin
National Bureau of Standards
Washington, D. C.

Optical Instruments
(Including Psychologic Selection and Training of Personnel)

Dr. Thornton C. Fry
Bell Telephone Laboratories
463 West Street
New York, N. Y.

Dr. Samuel Fernberger
Department of Psychology
University of Pennsylvania
Philadelphia, Pa.

Military Optical Instruments (except fire control)

Dr. Theodore Dunham, Jr.
Mount Wilson Observatory
813 Santa Barbara Street
Pasadena 4, California

Camouflage, Visibility of Targets

Dr. S. Q. Duntley
Department of Physics
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Infrared and Ultraviolet Topics in General

Dr. R. C. Lord
Department of Chemistry
Johns Hopkins University
Baltimore, Maryland

Phosphors, particularly Ultraviolet and Infrared Sensitive Phosphors

Dr. Brian O'Brien
Institute of Optics
University of Rochester
Rochester, N. Y.

SOUND

Acoustic Fuzes

Dr. H. L. Dryden
National Bureau of Standards
Washington, D. C.

Underwater Sound

Dr. Lyman Spitzer, Jr.
Department of Astronomy
Yale University
New Haven, Connecticut

Dr. P. M. Morse
Physics Department
Massachusetts Institute of Tech.
Cambridge 39, Massachusetts

Underwater Sound Equipment

Mr. T. E. Shea
P. O. Box 987
Church Street Annex
New York, N. Y.

Dr. R. H. Bolt
Room 6403
Empire State Building
New York, N. Y.

Sound Ranging, Sound Control, Firing Error Indicator, Supersonics

Dr. Harvey Fletcher
Bell Telephone Laboratories
463 West Street
New York 14, N. Y.

Dr. V. O. Knudsen
Department of Physics
University of California
Los Angeles 24, California

Dr. L. J. Sivian
Bell Telephone Lab.
463 West Street
New York 14, N. Y.

Effect and Production of Noise

Dr. W. L. Woolf
Stevens Institute of Technology
Hoboken, N. J.

Mr. Halloway Davis
Department of Physiology
Harvard University
Cambridge, Massachusetts

BALLISTICS

Terminal Ballistics

Professor Walker Bleakney
Physics Department
Princeton University
Princeton, N. J.

Interior Ballistics of Rockets

Prof. J. B. Rosser
Cornell University
Ithaca, N. Y.

Dr. F. T. McClure
3410 B. S. Utah
Farlington, Virginia

Dr. John Beek, Jr.
Shell Development Company
Emeryville, California

Dr. R. B. Kershner
Applied Physics Laboratory
Silver Springs, Maryland

Dr. C. T. Elvey
Naval Ordnance Test Station
Inyokern, California

Prof. B. H. Sage
California Institute of Technology
Pasadena, California

Exterior Ballistics of Rockets

Dr. Leverett Davis, Jr.
Bell Telephone Laboratories
463 West Street
New York, N. Y.

Prof. I. Bowen
Mount Wilson Observatory
813 Santa Barbara Street
Pasadena 4, California

Prof. J. B. Rosser
Cornell University
Ithaca, N. Y.

Prof. W. J. Harrington
Pennsylvania State College
State College, Pa.

Ballistics Research

Dr. J. S. Burlew
Geophysical Laboratory
Carnegie Institution of Washington
2801 Upton Street, N.W.
Washington, D. C.

EXPLOSIVES

Analytical Studies related to Fragmentation Characteristics

Dr. M. M. Day
University of Illinois
Urbana, Illinois

Dr. Milton Friedman
University of Minnesota
Minneapolis, Minnesota

Shock Waves

Professor Walker Bleakney
Princeton University
Princeton, N. J.

Physics of Explosions (particularly under water)

Professor Paul C. Cross
Oceanographic Institute
Woods Hole, Massachusetts

Explosion Phenomena

Dr. E. Bright Wilson, Jr.
Harvard University
Cambridge 38, Massachusetts

Theoretical Studies of Explosives

Dr. H. P. Robertson
Princeton University
Princeton, N. J.

Dr. J. G. Kirkwood
Cornell University
Ithaca, N. Y.

Dr. E. Bright Wilson, Jr.
Harvard University
Cambridge, Massachusetts

Dr. G. B. Kistiakowsky
Harvard University
Cambridge, Massachusetts

ELECTRONICS (Radio, Radar, etc.)

Wave Propagation and Electronics

Dr. Sergei Schelkunoff
Bell Telephone Laboratories
463 West Street
New York, N. Y.

Prof. Leon Brillouin
Columbia University
New York, N. Y.

Acoustic Fuzes

Dr. H. L. Dryden
National Bureau of Standards
Washington, D. C.

Photo Electric Fuzes

Dr. A. V. Astin
National Bureau of Standards
Washington, D. C.

Sound Ranging, Sound Control, Firing Error Indicator, Supersonics

Dr. Harvey Fletcher
Bell Telephone Laboratories
463 West Street
New York, N. Y.

Dr. V. O. Knudsen
Department of Physics
University of California
Los Angeles 24, California

Dr. L. J. Sivian
Bell Telephone Laboratories
463 West Street
New York, N. Y.

Radio Fuzes

Dr. A. V. Astin
National Bureau of Standards
Washington, D. C.

Dr. R. D. Huntoon
National Bureau of Standards
Washington, D. C.

Mr. W. S. Hinman, Jr.
National Bureau of Standards
Washington, D. C.

Prof. James A. Jacobs
State University of Iowa
Iowa City, Iowa

Television

Dr. Pierre Mertz
Bell Telephone Laboratories
463 West Street
New York, N. Y.

Dr. A. F. Murray
Room 601
1424 - 16th Street, N. W.
Washington 25, D. C.

Ultra High Frequency Techniques, Communication Electronics

Dr. Ivan A. Getting
Associate Professor of
Electrical Engineering
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Electronic Simulation

Prof. John B. Russell
Department of Electrical Engineering
Columbia University
New York, N. Y.

Mr. George A. Philbrick
14 Scott Street
Cambridge, Massachusetts

Electrical Communications

Dr. C. B. Jolliffe
Radio Corporation of America
Rockefeller Plaza
New York, N. Y.

Dr. A. F. Murray
Room 601
1424 - 16th Street, N. W.
Washington 25, D. C.

Radio Transmitters, Receivers, Radio Systems

Dr. F. E. Terman
Department of Electrical Engineering
Stanford University
Palo Alto, California

Mr. John Dyer
Airborne Instruments Laboratory
Mineola, Long Island, N. Y.

Mr. H. R. Skifter
Airborne Instruments Laboratory
Mineola, Long Island, N. Y.

Mr. J. F. Byrne
Radio Research Laboratory
Harvard University
Cambridge 38, Massachusetts

Radio Wave Propagation

Professor Stephen S. Atwood
Electrical Engineering Department
University of Michigan
Ann Arbor, Michigan

Dr. Julius A. Stratton
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dr. Harold H. Beverage
Associate Research Director
RCA Laboratories
66 Broad Street
New York, N. Y.

Dr. Charles R. Burrows
School of Electrical Engineering
Cornell University
Ithaca, N. Y.

Radar
(Including Systems, Components, etc.)

Dr. Ralph Bown
Bell Telephone Laboratories
463 West Street
New York, N. Y.

Mr. James Fisk
Bell Telephone Laboratories
463 West Street
New York, N. Y.

Mr. L. B. Linford
39 Choate Road
Belmont, Massachusetts

Mr. J. R. Pierce
Bell Telephone Laboratories
463 West Street
New York, N. Y.

Mr. A. W. Hull
Research Laboratory
General Electric Company
Schenectady, N. Y.

Dr. C. G. Suits
Research Laboratory
General Electric Company
Schenectady, N. Y.

Mr. J. A. Hutchison
Westinghouse Electric Corp.
East Pittsburgh, Pa.

Dr. E. Condon
National Bureau of Standards
Washington, D. C.

Mr. E. W. Engstrom
RCA Laboratories
Princeton, N. J.

Mr. D. O. North
RCA Laboratories
Princeton, N. J.

Mr. W. W. Hansen
Stanford University
Palo Alto, California

Mr. E. L. Ginzton
Stanford University
Palo Alto, California

Mr. E. Feenberg
Sperry Gyroscope Company
New York, N. Y.

Dr. L. N. Ridenour
Department of Physics
University of Pennsylvania
Philadelphia, Pa.

Dr. Julian K. Knipp
Iowa State College
Ames, Iowa

Mr. J. L. Lawson
1330 Garner Avenue
Schenectady, N. Y.

Dr. S. A. Goudsmit
Department of Physics
University of Michigan
Ann Arbor, Michigan

Mr. B. L. Chance
Johnson Foundation
University of Pennsylvania
Philadelphia, Pa.

Mr. G. E. Valley, Jr.
55 Frost Street
Cambridge, Massachusetts

Mr. C. G. Montgomery
Sloan Physics Laboratory
Yale University
New Haven, Connecticut

Dr. L. A. Turner
Department of Physics
Iowa State University
Iowa City, Iowa

Dr. R. G. Herb
Physics Department
University of Wisconsin
Madison, Wisconsin

Dr. G. B. Collins
Department of Physics
University of Notre Dame
Notre Dame, Indiana

Dr. H. M. James
Department of Physics
Purdue University
Lafayette, Indiana

Radio Telemetering

Dr. G. E. Beggs
Room 315, Fox Building
1612 Market Street
Philadelphia, Pa.

Mr. J. B. Nichols
E. I. duPont de Nemours
Wilmington, Delaware

MECHANICS

Mechanics, Including Mechanics of Deformable Media

Dr. W. Prager
Brown University
Providence, Rhode Island

Dr. I. S. Sokolnikoff
University of Wisconsin
Madison, Wisconsin

Dr. J. J. Stoker
New York University
New York, N. Y.

Dr. Theodore von Karman
California Institute of Technology
Pasadena, California

Dynamic Properties of Metals

Mr. P. E. Kyle
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Mr. L. R. Jackson
Battelle Memorial Institute
Columbus, Ohio

SC 1600 Series I Box 3 1946-47

INSTRUMENTATION

Mathematical Treatment

Dr. J.K.L. MacDonald
Cooper Union for the Advancement of Science and Art
New York, N. Y.

Computing Equipment

Dr. George R. Stibitz
University of Vermont
Waterman Building
Burlington, Vermont

Dr. John von Neumann
Institute for Advanced Study
Princeton University
Princeton, N. J.

Instrumentation Applied to Ballistics

Mr. Carl Lathrop
Standard Oil of New Jersey
Elizabeth, N. J.

Servo Mechanisms as Applied to Guided Missiles

Mr. Hugh Spencer
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dr. J. C. Boyce
Department of Physics
New York University
New York, N. Y.

Radio Telemetering

Dr. G. E. Beggs
Room 315, Fox Building
1612 Market Street
Philadelphia, Pa.

Mr. J. B. Nichols
E. I. duPont de Nemours
Wilmington, Delaware

Mechanical and Electronic Computing Devices

Dr. S. H. Caldwell
Room 7-308, Massachusetts
Institute of Technology
Cambridge 39, Massachusetts

Relay Computing Mechanisms

Dr. George R. Stibitz
University of Vermont
Waterman Building
Burlington, Vermont

Pneumatic Control Techniques and Devices

Mr. Edward J. Poitras
198 Highland Street
Holliston, Massachusetts

Oscillographs

Mr. T. H. Johnson
Ordnance Department
Army Service Forces
Aberdeen Proving Grounds
Aberdeen, Maryland

Servomechanisms and Automatic Control Devices

Mr. Edward J. Poitras
198 Highland Street
Holliston, Massachusetts

MISCELLANEOUS MILITARY APPLICATIONS

Rocket Design

Prof. C. C. Lauritsen
California Institute of Technology
Pasadena, California

Dr. C. N. Hickman
Bell Telephone Laboratories
463 West Street
New York, N. Y.

Prof. W. A. Fowler
California Institute of Technology
Pasadena, California

Toss Bombing

Dr. William B. McLean
N. O. T. S.
Inyokern, California

Dr. W. L. Witson
N. O. T. S.
Inyokern, California

Dr. V. W. Cohen
National Bureau of Standards
Washington, D. C.

Prof. James A. Jacobs
State University of Iowa
Iowa City, Iowa

General Guided Missiles Considerations

Mr. Hugh H. Spencer
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dr. J. C. Boyce
Department of Physics
New York University
New York, N. Y.

Glide Bombs

Dr. Hugh L. Dryden
National Bureau of Standards
Washington, D. C.

Dr. J. C. Boyce
Department of Physics
New York University
New York, N. Y.

High Angle Bombs

Dr. L. O. Grondahl
Union Switch and Signal Co.
Pittsburgh 18, Pa.

Dr. E. W. Phelan
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Homing Systems

Dr. Hugh L. Dryden
National Bureau of Standards
Washington, D. C.

Dr. J. C. Boyce
Department of Physics
New York University
New York, N. Y.

Underwater Ordnance

Dr. L. G. Straub
Room 6402
Empire State Building
New York, N. Y.

Dr. R. H. Bolt
Room 6403
Empire State Building
New York, N. Y.

Mine Detection Equipment, Odographs

Dr. E. A. Eckhardt
Gulf Research and Development Co.
Pittsburgh, Pa.

Dr. H. E. Bragg
c/o The Lambs
130 West 44th Street
New York 18, N. Y.

Mr. J. A. Hornbeck
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Communication, Combat Information Centers
Binaural Listening, Acoustical Jamming

Dr. S. S. Stevens
Harvard Medical School
25 Shattuck Street
Boston, Massachusetts

Dr. C. T. Morgan
Cruft Laboratory
Harvard University
Cambridge, Massachusetts

Dr. L. A. Beranek
Cruft Laboratory
Harvard University
Cambridge, Massachusetts

Prof. P. M. Morse
Physics Department
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

MAGNETISM

Magnetic Field Extrapolating Machine

Prof. G. Breit
University of Wisconsin
Madison, Wisconsin

Prof. J.W.M. DuMond
California Institute of Tech.
Pasadena, California

Sensitivity Testing

Dr. Alexander Mood
Iowa State College
Ames, Iowa

X-RAY RADIOGRAPHY

X-Ray Radiography

Prof. R. J. Van de Graaff
Physics Department
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Lt. Comdr. C. S. Piggot
Bureau of Ordnance
Navy Department
Washington 25, D. C.

PSYCHOLOGY

PSYCHOLOGY

Selection, Classification and Achievement Testing Devices and Procedures

Dr. Dael L. Wolfle
Executive Secretary
American Psychological Association
2101 Constitution Avenue
Washington, D. C.

Dr. Harold O. Gulliksen
College Entrance Examination Board
2½ Chambers Street
Princeton, N. J.

Psychological Problems in Design and Operation of Military Equipment

Dr. Charles W. Bray
Dept. of Psychology
Princeton University
Princeton, N. J.

Dr. William E. Kappauf
Dept. of Psychology
Princeton University
Princeton, N. J.

The Training of Military Specialists

Dr. William C. Biel
Dept. of Psychology
Dennison University
Granville, Ohio

Dr. John L. Kennedy
Psychology Laboratory
Tufts College
Medford, Massachusetts

Effect and Production of Noise

Dr. W. L. Woolf
Stevens Institute of Technology
Hoboken, N. J.

Dr. Halloway Davis
Dept. of Physiology
Harvard University
Cambridge, Massachusetts

METALLURGY

METALLURGY

Non-Ferrous Metallurgy, General

Mr. L. L. Wyman
Research Laboratory
General Electric Company
Schenectady, N. Y.

Mr. D. C. Minton, Jr.
Battelle Memorial Institute
Columbus, Ohio

Metallography and Heat Treatment of Steels

Mr. Jerome Strauss
Vice-President
Vanadium Corp. of America
420 Lexington Avenue
New York 17, N. Y.

Dr. C. H. Lorig
Battelle Memorial Institute
Columbus 1, Ohio

Rocket Metallurgy

Dr. H. C. Cross
Battelle Memorial Institute
Columbus, Ohio

Dr. H. C. Stumpf
1413 Fifth Street
Moundsville, West Virginia

Enemy Material (Applied to Metallurgy)

Mr. C. R. Maxon
Market Development Division
The New Jersey Zinc Company
160 Front Street
New York 7, N. Y.

Dr. H. W. Gillett
Battelle Memorial Institute
Columbus 1, Ohio

Season Cracking of Brass

Mr. L. L. Wyman
Research Laboratory
General Electric Company
Schenectady, N. Y.

Dr. C. H. Lorig
Battelle Memorial Institute
Columbus 1, Ohio

Aircraft Materials (Aluminum, Magnesium, Shot Peening)

Mr. L. L. Wyman
Research Laboratory
General Electric Company
Schenectady, N. Y.

Dr. V. H. Schnee
Battelle Memorial Institute
Columbus 1, Ohio

Dynamic Properties of Metals

Mr. P. E. Kyle
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Mr. L. R. Jackson
Battelle Memorial Institute
Columbus 1, Ohio

Foundry Problems and Materials

Dr. A. E. Schuh
U.S. Pipe & Foundry Company
Burlington, N. J.

Dr. C. H. Lorig
Battelle Memorial Institute
Columbus 1, Ohio

Alloys for High Temperature Service

Mr. H. C. Cross
Battelle Memorial Institute
Columbus 1, Ohio

Mr. N. L. Mochel
Westinghouse Electric & Mfg. Co.
Lester Branch P. O.
Philadelphia 13, Pa.

Low-Alloy, High Strength Steels (including boron-treated steel)

Dr. C. H. Lorig
Battelle Memorial Institute
Columbus 1, Ohio

Mr. Jerome Strauss, Vice-Pres.
Vanadium Corp. of America
420 Lexington Avenue
New York 17, N. Y.

Welding Ordnance

Mr. G. S. Mikhalapov
Air Reduction Company
Lincoln Building
East 42nd Street
New York 17, N. Y.

Dr. A. Muller
War Metallurgy Committee
92 Liberty Street
Room 1505
New York 6, N. Y.

Welding, Ships

Dr. Finn Johassen
War Metallurgy Committee
92 Liberty St., Room 1505
New York 6, N. Y.

Mr. Hugo Hiemke
A. O. Smith Corporation
Los Angeles, California

CHEMISTRY

PROPELLANTS

Chemistry of Rocket Propellants (solids)

a. Double base powders

Dr. R. E. Gibson
415 Cumberland Avenue
Chevy Chase, Maryland

Prof. B. H. Sage
California Institute of Technology
Pasadena, California

Prof. B. L. Crawford, Jr.
Dept. of Chemistry
University of Minnesota
Minneapolis, Minnesota

Dr. W. H. Avery
A. D. Little & Company
Cambridge, Massachusetts

b. Other than double base powders

Prof. L. P. Hammett
Dept. of Chemistry
Columbia University
New York, N. Y.

Dr. J. F. Kincaid
General Electric Research Laboratory
Schenectady, N. Y.

Physical Chemistry of Propellants

Dr. L. P. Hammett
Columbia University
New York, N. Y.

Dr. John Kincaid
General Electric Company
Schenectady, N. Y.

Dr. F.H. Westheimer
University of Chicago
Chicago, Illinois

EXPLOSIVES

Organic Chemistry of Explosives

Dr. S.R. Aspinall
1703 32nd Street, N.W.
Washington, D. C.

Dr. A. H. Blatt
Queens College
Flushing, N. Y.

Dr. Ralph Connor
Rohm & Haas
5000 Richmond Street
Bridesburg, Philadelphia, Pa.

Dr. John R. Johnson
Cornell University
Ithaca, N. Y.

Dr. F. H. Westheimer
University of Chicago
Chicago, Illinois

Physical Chemistry of High Explosives

Dr. G.B. Kistiakowsky
Harvard University
Cambridge, Massachusetts

Dr. D.P. MacDougall
Naval Ordnance Laboratory
Naval Gun Factory
Navy Yard
Washington, D. C.

Dr. E.B. Wilson, Jr.
Harvard University
Cambridge, Massachusetts

Theoretical Studies of Explosives

Dr. H. P. Robertson
Princeton University
Princeton, N. J.

Dr. E. B. Wilson, Jr.
Harvard University
Cambridge, Massachusetts

Dr. J. G. Kirkwood
Cornell University
Ithaca, N. Y.

Dr. G.B. Kistiakowsky
Harvard University
Cambridge, Massachusetts

GASES

Oxygen, Oxygen Producers

Mr. E. P. Stevenson
Arthur D. Little, Inc.
Cambridge, Massachusetts

Dr. J. H. Rushton
Dept. of Chemical Engineering
University of Virginia
Charlottesville, Virginia

Oxygen Producing Chemicals

Dr. S. S. Prentiss
Phillips Petroleum Company
Bartlesville, Oklahoma

Dr. T. A. Geissman
University of California
Los Angeles, California

Thermodynamic Properties of Air and its Constituents

Dr. John G. Aston
201 High Street
Pennsylvania State College
State College, Pa.

Dr. B. F. Dodge
Yale University
New Haven, Connecticut

Dr. Serge Gratch
University of Pennsylvania
Philadelphia, Pa.

Air Purification

Dr. W. L. McCabe
Carnegie Institute of Technology
Pittsburgh, Pa.

Dr. J.G.Aston
201 High Street
Pennsylvania State College
State College, Pa.

Dr. B.F.Dodge
Yale University
New Haven, Conn.

Handling and Utilization of Liquid Air

Dr. S. S. Prentiss
Phillips Petroleum Company
Bartlesville, Oklahoma

Dr. F.G. Keyes
Department of Chemistry
Massachusetts Institute of Tech.
Cambridge, Massachusetts

Detection and Analysis of CW Agents

Dr. Carl Niemann
California Institute of Technology
Pasadena, California

Dr. W. C. Johnson
Dept. of Chemistry
University of Chicago
Chicago, Illinois

Aerosols, Filtration, and Smokes in General

Prof. W.H.Rhodebush
Dept. of Chemistry
University of Illinois
Urbana, Illinois

Dr. W. A. Noyes, Jr.
Dept. of Chemistry
Univ. of Rochester
Rochester, N. Y.

Dr. W. D. Walters
Dept. of Chemistry
University of Rochester
Rochester, N. Y.

Adsorption, Charcoal, Soda Lime, and the Common Nonpersistent Gases

Prof. W. C. Pierce
Dept. of Chemistry
Pamona College
Claremont, California

Dr. W. A. Noyes
Dept. of Chemistry
University of Rochester
Rochester, N. Y.

Dr. W. D. Walters
Dept. of Chemistry
University of Rochester
Rochester, N. Y.

Structure of Adsorbents, Mechanical Designs of Munitions and White Phosphorus, DDT Dispersal, and Distribution of Smoke Producing Materials in General

Prof. H.F.Johnstone
Dept. of Chemistry
Univ. of Illinois
Urbana, Illinois

Dr. W. A. Noyes
Dept. of Chemistry
University of Rochester
Rochester, N. Y.

Dr. W. D. Walters
Dept. of Chemistry
University of Rochester
Rochester, N. Y.

Pressure Gas Techniques and Processes

Dr. F. G. Keyes
Department of Chemistry
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dr. W. F. Giauque
Univ. of California
Berkeley, California

Mr. Wolcott Denis
Air Reduction Co.
41 Magee Avenue
Stanford, Connecticut

Low Pressure Gas Liquefaction

Dr. B. F. Dodge
Yale University
New Haven, Connecticut

Dr. W. E. Lobo
M.W. Kellogg Company
325 Broadway
New York, N. Y.

Mr. S. C. Collins
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dr. C. C. Furnas
Curtiss Wright Airplane Division
Genesee Street
Buffalo, N. Y.

Fuel Quantity Gauge, Infrared Detection of Gases — Oscillographs

Dr. C. B. Bazzoni
Sun Oil Geophysical Laboratory
Norwood, Pa.

Mr. T. H. Johnson
Ballistics Laboratory
Aberdeen Proving Ground
Aberdeen, Maryland

FUELS

Thickened Fuels

Dr. Geoffrey Broughton
Eastman Kodak Company
Kodak Park
Rochester, N. Y.

Dr. E. K. Carver
Eastman Kodak Company
Kodak Park
Rochester, N. Y.

Dr. R. H. Ewell
Shell Chemical Division
100 Bush Street
San Francisco, California

Mr. E. P. Stevenson
Arthur D. Little, Inc.
Cambridge, Massachusetts

Dr. H. C. Hottel
Dept. of Chemical Engineering
Mass. Institute of Technology
Cambridge, Massachusetts

Flame Throwers and Theory of Flame Thrower Jets

Dr. R. H. Ewell
Shell Chemical Division
100 Bush Street
San Francisco, California

Mr. T. V. Moore
Dept. of Chemical Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dr. C. S. Keevil
Arthur D. Little, Inc.
30 Memorial Drive
Cambridge, Massachusetts

Mr. E. P. Stevenson
Arthur D. Little, Inc.
Cambridge, Massachusetts

Dr. H. C. Hottel
Dept. of Chemical Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts

Incendiaries Principles

Dr. C. S. Keevil
Arthur D. Little, Inc.
30 Memorial Drive
Cambridge, Massachusetts

Mr. E. P. Stevenson
Arthur D. Little, Inc.
Cambridge, Massachusetts

Dr. H. C. Hottel
Dept. of Chemical Engineering
Mass. Institute of Technology
Cambridge, Massachusetts

Fuel Quantity Gauge, Infrared Detection of Gases

Dr. C. B. Bazzoni
Sun Oil Geophysical Laboratory
Norwood, Pa.

MISCELLANEOUS CHEMICAL ENGINEERING

Plant Processes Involving Charcoal, Impregnations, Etc.

Prof. W.L. McCabe
Dept. of Chemical Engineering
Carnegie Institute of Technology
Pittsburgh, Pa.

Dr. W. A. Noyes
Dept. of Chemistry
Univ. of Rochester
Rochester, N. Y.

Dr. W. D. Walters
Dept. of Chemistry
Univ. of Rochester
Rochester, N. Y.

Miscellaneous Chemical Engineering Problems

Mr. E. P. Stevenson
Arthur D. Little, Inc.
Cambridge, Massachusetts

Dr. T. K. Sherwood
Dept. of Chemical Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts

Low Temperature Processes

Mr. W. E. Lobo
M.W. Kellogg Company
325 Broadway
New York, N. Y.

Dr. B. F. Dodge
Yale University
New Haven, Connecticut

TOXICOLOGY AND PHARMACOLOGY

Toxicology and Pharmacology

Dr. H. S. Gasser, Director
Rockefeller Institute for Medical Research
66th Street & York Avenue
New York, N. Y.

Dr. William L. Doyle
Dept. of Anatomy
University of Chicago
Chicago, Illinois

Dr. R. K. Carman
Dept. of Biochemistry
New York University College of Medicine
New York, N. Y.

Dr. F. C. McLean
Dept. of Physiology
Univ. of Chicago
Chicago, Illinois

MISCELLANEOUS ORGANIC SYNTHESIS

General Organic Synthesis, Anti-Malarial Agents, Insecticides and Insect Repellents

Dr. A. C. Cope
Dept. of Chemistry
Mass. Institute of Technology
Cambridge, Massachusetts

Dr. Marshall Gates
Dept. of Chemistry
Bryn Mawr College
Bryn Mawr, Pa.

Dr. C. S. Hamilton
Dept. of Chemistry
Univ. of Nebraska
Lincoln, Nebraska

W. M. Kirner
1424 - 16th Street, N.W.
Washington, D. C.

Dr. C. S. Marvel
Dept. of Chemistry
University of Illinois
Urbana, Illinois

Organic Synthesis, Impregnites, Formulation of Protective Cintments and Protective Clothing

Dr. Homer Adkins
Dept. of Chemistry
University of Wisconsin
Madison, Wisconsin

Dr. Wilkins Reeve
Dept. of Chemistry
University of Maryland
College Park, Maryland

MATHEMATICS

BALLISTICS

Terminal Ballistics

Prof. Walker Bleakney
Princeton University
Princeton, N. J.

Interior Ballistics of Rockets

Prof. J. B. Rosser
Cornell University
Ithaca, N. Y.

Dr. F. T. McClure
3410-B S. Utah
Fairlington, Virginia

Dr. John Beek, Jr.
Shell Development Company
Emeryville, California

Dr. R. R. Kershner
Applied Physics Laboratory
Silver Springs, Maryland

Dr. C. T. Elvey
Naval Ordnance Test Station
Inyokern, California

Prof. B. H. Sage
California Institute of Technology
Pasadena, California

Exterior Ballistics of Rockets

Dr. Leverett Davis, Jr.
Bell Telephone Laboratories
New York, N. Y.

Prof. I. Bowen
California Institute of Technology
Pasadena, California

Prof. J. B. Rosser
Cornell University
Ithaca, N. Y.

Prof. W. J. Harrington
Pennsylvania State College
State College, Pa.

STATISTICS

Theoretical Statistical Studies

Dr. S. S. Wilks
Princeton University
Princeton, N. J.

Dr. Jacob Wolfowitz
University of North Carolina
Chapel Hill, North Carolina

MECHANICS

Mechanics, Including Mechanics of Deformable Media

Dr. W. Prager
Brown University
Providence, R. I.

Dr. I. S. Sokolnikoff
University of Wisconsin
Madison, Wisconsin

Dr. J. J. Stoker
New York University
New York, N. Y.

Dr. Theodore Von Karman
California Institute of Technology
Pasadena, California

TESTING PROCEDURES

Sensitivity Testing

Dr. Alexander Mood
Iowa State College
Ames, Iowa

Acceptance Sampling

Dr. Abraham Wald
Columbia University
New York, N. Y.

Dr. W. A. Wallis
Stanford University
Palo Alto, California

Dr. Milton Friedman
University of Minnesota
Minneapolis, Minnesota

Selection, Classification and Achievement Testing Devices and Procedures

Dr. Dael L. Wolfle
Executive Secretary
American Psychological Association
2101 Constitution Avenue
Washington 25, D. C.

HEAT

Heat Conduction

Dr. J.K. L. MacDonald
Cooper Union for the Advancement
of Science and Art
New York, N. Y.

PROBABILITY

Probability Studies

Dr. Bernard O. Koopman
Columbia University
New York, N. Y.

Dr. S. S. Wilks
Princeton University
Princeton, N. J.

Dr. Jacob Wolfowitz
University of North Carolina
Chapel Hill, North Carolina

GAS AND HYDRODYNAMICS

Gas Dynamics and Hydrodynamics

Dr. Richard Courant
New York University
New York, N. Y.

Dr. Kurt O. Friedrichs
New York University
New York, N. Y.

Dr. Max Shiffman
College of City of New York
New York, N. Y.

Dr. J. J. Stoker
New York University
New York, N. Y.

Dr. John von Neumann
Institute for Advanced Study
Princeton University
Princeton, N. J.

EXPLOSIVES

Analytical Studies Related to Fragmentation Characteristics

Dr. M. M. Day
University of Illinois
Urbana, Illinois

Dr. Milton Friedman
University of Minnesota
Minneapolis, Minnesota

Shock Waves

Prof. Walker Bleakney
Princeton University
Princeton, N. J.

Explosion Phenomena

Dr. E. Bright Wilson, Jr.
Harvard University
Cambridge, Massachusetts

Theoretical Studies of Explosives

Dr. H. P. Robertson
Princeton University
Princeton, N. J.

Dr. J. G. Kirkwood
Cornell University
Ithaca, N. Y.

INSTRUMENTATION

Instrumentation (Mathematical Treatment)

Dr. J.K.L. MacDonald
Cooper Union for the Advancement
of Science and Art
New York, N. Y.

Magnetic Field Extrapolating Machine

Prof. G. Breit
University of Wisconsin
Madison, Wisconsin

Prof. J.W.M. DuMond
California Institute of Technology
Pasadena, California

AIR WARFARE

Studies Growing Out of Analytical Aspects of Aerial Warfare

Dr. Saunders MacLane
Harvard University
Cambridge, Massachusetts

Dr. Magnus Hestenes
University of Chicago
Chicago, Illinois

Pursuit Curve Theory

Dr. L. W. Cohen
University of Kentucky
Lexington, Kentucky

Dr. L. J. Savage
New York University
New York, N. Y.

Toss Bombing

Dr. William B. McLean
N.O.T.S.
Inyokern, California

Dr. W. L. Witson
N.O.T.S.
Inyokern, California

Dr. V. W. Cohen
National Bureau of Standards
Washington, D. C.

Prof. James A. Jacob
Iowa University
Iowa City, Iowa

COMPUTING DEVICES

Computing Equipment

Dr. George R. Stibitz
University of Vermont
Waterman Building
Burlington, Vermont

Dr. John von Neumann
Institute for Advanced Study
Princeton University
Princeton, N. J.

Mechanical and Electronic Computing Devices

Dr. S. H. Caldwell
Massachusetts Institute of Technology
Room 7-308
Cambridge 39, Massachusetts

Relay Computing Mechanisms

Dr. George R. Stibitz
University of Vermont
Waterman Building
Burlington, Vermont

SERVO MECHANISMS

Servo Mechanisms as Applied to Guided Missiles

Mr. Hugh Spencer
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dr. J. C. Boyce
New York University
New York, N. Y.

Servo Mechanisms and Automatic Control Devices

Mr. Edward J. Poitras
198 Highland Street
Holliston, Massachusetts

Dr. Gordon S. Brown
Servomechanisms Laboratory
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

FLAME THROWERS

Flame Throwers and Theory of Flame Thrower Jets

Dr. R. H. Ewell
Shell Chemical Division
100 Bush Street
San Francisco, California

Dr. C. S. Keevil
Arthur D. Little, Inc.
30 Memorial Drive
Cambridge, Massachusetts

Dr. H. C. Hottel
Department of Chemical Engineering
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Mr. T. V. Moore
Department of Chemical Engineering
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dr. E. P. Stevenson
A. D. Little, Inc.
Cambridge, Massachusetts

BIOLOGY

BIOLOGY

General Organic Synthesis, Anti-Malarial Agents, Insecticides and Insect Repellents

Dr. A. C. Cope
Department of Chemistry
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dr. Marshall Gates
Department of Chemistry
Bryn Mawr College
Bryn Mawr, Pa.

Dr. C. S. Hamilton
Department of Chemistry
University of Nebraska
Lincoln, Nebraska

Dr. W. R. Kirner
Room 716
1424 - 16th Street, N.W.
Washington 25, D. C.

Dr. C. S. Marvel
Department of Chemistry
University of Illinois
Urbana, Illinois

Organic Synthesis, Impregnites, Formulation of Protective Ointments and Protective Clothing

Dr. Homer Adkins
Department of Chemistry
University of Wisconsin
Madison, Wisconsin

Dr. Wilkins Reeve
Department of Chemistry
University of Maryland
College Park, Maryland

Toxicology and Pharmacology

Dr. H. S. Gasser, Director
Rockefeller Institute for Medical Research
66th and York Avenue
New York, N. Y.

Dr. R. C. Cannan
Department of Biochemistry
New York University
New York, N. Y.

Dr. William L. Doyle
Department of Anatomy
University of Chicago
Chicago, Illinois

Dr. F. C. McLean
Department of Physiology
University of Chicago
Chicago, Illinois

Physiology and Physiological Mechanism of Action of Agents

Dr. Homer Smith
New York University
College of Medicine
477 First Avenue
New York, N. Y.

Dr. Birdsey Renshaw
Rockefeller Institute for Medical Research
66th Street and York Avenue
New York, N. Y.

Action of Heat on Animal Organisms

Dr. A. R. Moritz
Harvard University
School of Medicine
Boston, Massachusetts

Dr. F. C. Henriques
Harvard University
School of Medicine
Boston, Massachusetts

Structure of Adsorbents, Mechanical Designs of Munitions, White Phosphorus, DDT Dispersal and Distribution of Smoke Producing Materials in General

Prof. H. F. Johnstone
Department of Chemistry
University of Illinois
Urbana, Illinois

Dr. W. A. Noyes
Chemistry Department
University of Rochester
Rochester, N. Y.

Dr. W. D. Walters
Chemistry Department
University of Rochester
Rochester, N. Y.

Air Purification

Dr. W. L. McCabe
Carnegie Institute of Technology
Pittsburgh, Pa.

Dr. J. G. Aston
201 High Street
Pennsylvania State College
State College, Pa.

Dr. B. F. Dodge
Yale University
New Haven, Connecticut

Mycology, with Particular Reference to Problems of Tropical Deterioration and its Prevention

Dr. Selman A. Waksman
New Jersey Agriculture Experiment Station
New Brunswick, N. J.

Dr. Glenn A. Greathouse
National Academy of Sciences
2101 Constitution Avenue
Washington, D. C.

Dr. Charles Heimsch
Swarthmore College
Swarthmore, Pa.

Dr. H. H. Yeston
Biological Laboratories
Harvard University
Cambridge, Massachusetts

Dr. Elso Barghoorn
Amherst College
Amherst, Massachusetts

Dr. J. G. Hutchinson
Johnson Foundation
University of Pennsylvania
Philadelphia, Pa.

TRANSPORTATION

TRANSPORTATION

Transportation, Dukws, Weasels, and Other Transportation

Mr. P. C. Putnam
140 Federal Street
Boston 10, Massachusetts

Mr. Hartley Rowe
1 Federal Street
Boston 10, Massachusetts

OCEANOGRAPHY

OCEANOGRAPHY

Oceanography

Dr. Lyman Spitzer, Jr.
Department of Astronomy
Yale University
New Haven, Connecticut

WAR DEPARTMENT
OFFICE OF THE CHIEF OF STAFF
WASHINGTON 25, D. C.

30 APR

MEMORANDUM FOR DIRECTORS AND CHIEFS OF WAR DEPARTMENT GENERAL AND SPECIAL STAFF DIVISIONS AND BUREAUS AND THE COMMANDING GENERALS OF THE MAJOR COMMANDS:

SUBJECT: Scientific and Technological Resources as Military Assets

The recent conflict has demonstrated more convincingly than ever before the strength our nation can best derive from the integration of all of our national resources in time of war. It is of the utmost importance that the lessons of this experience be not forgotten in the peacetime planning and training of the Army. The future security of the nation demands that all those civilian resources which by conversion or redirection constitute our main support in time of emergency be associated closely with the activities of the Army in time of peace.

The lessons of the last war are clear. The military effort required for victory threw upon the Army an unprecedented range of responsibilities, many of which were effectively discharged only through the invaluable assistance supplied by our cumulative resources in the natural and social sciences and the talents and experience furnished by management and labor. The armed forces could not have won the war alone. Scientists and business men contributed techniques and weapons which enabled us to outwit and overwhelm the enemy. Their understanding of the Army's needs made possible the highest degree of cooperation. This pattern of integration must be translated into a peacetime counterpart which will not merely familiarize the Army with the progress made in science and industry, but draw into our planning for national security all the civilian resources which can contribute to the defense of the country.

Success in this enterprise depends to a large degree on the cooperation which the nation as a whole is willing to contribute. However, the Army as one of the main agencies responsible for the defense of the nation has the duty to take the initiative in promoting closer relation between civilian and military interests. It must establish definite policies and administrative leadership which will make possible even greater contributions from science, technology, and management than during the last war.

In order to ensure the full use of our national resources in case of emergency, the following general policies will be put into effect:

(1) <u>The Army must have civilian assistance in military planning as well as for the production of weapons</u>. Effective long-range military planning can be done only in the light of predicted developments in science and technology. As further scientific achievements accelerate the tempo and expand the area of our operations, this interrelationship will become of even greater importance. In the past we have often deprived ourselves of vital help by limiting our use of scientific and technological resources to contracts for equipment. More often than not we can find much of the talent we need for comprehensive planning in industry or universities. Proper employment of this talent requires that the civilian agency shall have the benefit of our estimates of future military problems and shall work closely with Plans and the Research and Development authorities. A most effective procedure is the letting of contracts for aid in planning. The use of such a procedure will greatly enhance the validity of our planning as well as ensure sounder strategic equipment programs.

(2) <u>Scientists and industrialists must be given the greatest possible freedom to carry out their research</u>. The fullest utilization by the Army of the civilian resources of the nation cannot be procured merely by prescribing the military characteristics and requirements of certain types of equipment. Scientists and industrialists are more likely to make new and unsuspected contributions to the development of the Army if detailed directions are held to a minimum. The solicitation of assistance under these conditions would not only make available to the Army talents and experience otherwise beyond our reach, but also establish mutual confidence between ourselves and civilians. It would familiarize them with our fundamental problems and strengthen greatly the foundation upon which our national security depends.

(3) <u>The possibility of utilizing some of our industrial and technological resources as organic parts of our military structure in time of emergency should be carefully examined</u>. The degree of cooperation with science and industry achieved during the recent war should by no means be considered the ultimate. There appears little reason for duplicating within the Army an outside organization which by its experience is better qualified than we are to carry out some of our tasks. The advantages to our nation in economy and to the Army in efficiency are compelling reasons for this procedure.

of peace. The association of military and civilians in educational institutions and industry will level barriers, engender mutual understanding, and lead to the cultivation of friendships invaluable for future cooperation. The realization of our objectives places upon us, the military, the challenge to make our professional officers the equals in knowledge and training of civilians in similar fields and make our professional environment as inviting as those outside.

In the interest of cultivating to the utmost the integration of civilian and military resources and of securing the most effective unified direction of our research and development activities, this responsibility is being consolidated in a separate section on the highest War Department level. The Director of this section will be directly supported by one or more civilians, thus ensuring full confidence of both the military and the civilian in this undertaking. By the rotation of civilian specialists in this capacity we should have the benefit of broad guidance and should be able to furnish science and industry with a firsthand understanding of our problems and objectives. By developing the general policies outlined above under the leadership of the Director of Research and Development the Army will demonstrate the value it places upon science and technology and further the integration of civilian and military resources.

Dwight D. Eisenhower

(4) Within the Army we must separate responsibility for research and development from the functions of procurement, purchase, storage and distribution. Our experience during the war and the experience of industry in time of peace indicate the need for such a policy. The inevitable gap between the scientist or technologist and the user can be bridged, as during the last war, by field experimentation with equipment still in the developmental stage. For example, restricted-visibility operations with the aid of radar, such as blind bombing and control of tactical air, were made possible largely by bringing together technologists who know the potentialities of the equipment and field commanders familiar with combat conditions and needs. Future cooperation of this type requires that research and development groups have authority to procure experimental items for similar tests.

(5) Officers of all arms and services must become fully aware of the advantages which the Army can derive from the close integration of civilian talent with military plans and developments. This end cannot be achieved merely by sending officers to universities for professional training. It is true that the Army's need for officers well trained in the natural and social sciences requires a thorough program of advanced study for selected military personnel, but in addition we must supply inducements which will encourage these men in the continued practical application of scientific and technological thought to military problems. A premium must be placed on professional attainments in the natural and social sciences as well as other branches of military science. Officers in each arm and service must familiarize themselves as much as possible with progress and plans made in other branches. Only then can the Army obtain the administrative and operative talent essential to its task and mutual understanding by the arms and services of their respective problems.

In general, the more we can achieve the objectives indicated above with respect to the cultivation, support, and direct use of outside resources, the more energy will we have left to devote to strictly military problems for which there are no outside facilities or which for special security reasons can only be handled by the military. In fact, it is our responsibility deliberately to examine all outside resources as to adequacy, diversity, and geographical distribution and to ensure their full utilization as factors of security. It is our job to take the initiative to promote the development of new resources, if our national security indicates the need. It is our duty to support broad research programs in educational institutions, in industry, and in whatever field might be of importance to the Army. Close integration of military and civilian resources will not only directly benefit the Army, but indirectly contribute to the nation's security, as civilians are prepared for their role in an emergency by the experience gained in time

JUN 1 1946

MEMORANDUM

To Scientists and Engineers now or formerly associated with the
Office of Scientific Research and Development

General Eisenhower recently issued a notable memorandum on the relationship of the Army to civilian science and industry. Knowing that you would have special interest in it because of what you did in the development of the extraordinary working partnership between military and civilian personnel during the war, I asked permission to send you copies of this encouraging statement. It is essential that the cordial co-operation of the past six years continue in the peace, and this memorandum certainly demonstrates that the Army intends to do its full part in bringing that continuance about. Scientists and engineers who participated in the war effort will want to aid in every way possible.

The Office of Scientific Research and Development, as a war agency, can now accomplish little in this regard, for it is properly being liquidated in an orderly fashion. But the individuals who constituted that Office can accomplish a great deal as individuals, wherever they may now be located.

We have to remember, in this connection, that a new generation will take over in science and engineering, and they will probably do so before there is another major war, if such a disaster again occurs. It is hence essential that younger men participate to the utmost.

We should, therefore, discuss this matter particularly with the younger men of great promise with whom we have contact. No immediate and direct action on their part is called for by this memorandum. But they can be assured that the Army looks forward to a period of intense collaboration with civilian scientists and engineers, that this is the fixed and genuine policy of the General Staff, and that they should utilize every occasion to remain acquainted with military matters and stand ready to respond to opportunities to be of service.

Just as we left our regular affairs in an emergency to give our efforts to the common cause, so they, by contributing to the real strength of this country in these difficult times, will be working for our continued security in a hazardous world, and thus genuinely building the strength which this nation must have if it is to lead the way toward permanent peace.

V. Bush

RESEARCH LABORATORY
GENERAL ELECTRIC COMPANY
SCHENECTADY, NEW YORK

JUL 11 1947

July 8, 1947

Col. W. S. Bowen
Office of Scientific Research
and Development
1530 P Street, N.W.
Washington 25, D. C.

Dear Colonel Bowen:

I am enclosing herewith the information which you requested in your letter of July 3rd on Division 15 personnel and contractors' personnel. I am also sending a copy of this material to Mr. Moore and Dr. Terman because there are some gaps in my information which I am sure they will be able to fill.

Yours very truly,

Original signed by
C. G. Suits

CGSuits:FW
Enc.
cc: Mr. J. H. Moore
Dr. F. L. Terman

Alford: Present business address - Andrew Alford, Consulting Engineer, 346 Somerville Ave., Somerville 43, Mass.

Benning: Mr. Benning's work for Division 15, as a member of the Bell Telephone Laboratories, comprised a variety of special assignments associated with communications countermeasures. Besides the Pacific trip to which you have referred, he participated in the "Big Ben" project at AIL. This job entailed the emergency modification of some FM broadcasting transmitters for buzz bomb jamming in Great Britain. Mr. Benning contributed particularly to the adaption of "Stingaree" antennae to this project. When the equipment was shipped to Great Britain, he went with it as a technical expert and helped to set it up and put the transmitters through their field trials. Mr. Moore can doubtless give additional information concerning Mr. Benning.

Black: Dr. K.C. Black's present address is: Aircraft Radio Corporation, Boonton, New Jersey. Dr. Black took the principal responsibility in Division 15 for communications countermeasures. He personally instigated a great many of the projects which were carried out in the laboratories of Division 15 contractors. Throughout the war he was, more than anyone else in the country, continually investigating the possibilities of jamming enemy communications. In this work he consulted with Army and Navy communications officers, and radio experts in our contractors' laboratories, and took a trip to Great Britain to examine the prospects for communications jamming with the British and the U. S. field forces. Although the opportunities for jamming communications were limited because of the value to our own forces of enemy transmissions, Dr. Black performed an outstanding service in continually investigating this subject and advising Division 15 as to the needs of communications countermeasures.

Byrne: Mr. Byrne came to AIL on December 1, 1945, presumably leaving RRL immediately prior to this time. Dr. Terman will, I hope, write to you concerning his activities.

Cahill: Mr. Cahill left RRL in October 1945. He is now at AIL, Mineola, Long Island. Dr. Terman can more fully describe his work than I.

Chase: I hope Dr. Terman will have the required information.

Cullum: Mr. Cullum left RRL about September 1, 1945. His work was principally concerned with Radio Research Laboratory, which Dr. Terman can describe, except in the case of some special assignments which he accomplished for Division 15. Noteworthy is the investigation which he undertook for the purpose of determining why radio countermeasures equipment produced in this country was not getting into use in the European Theatre. As a result of this work, the entire procedure for the requesting of, producing, and shipping of this type of electronics gear was overhauled in the Army Air Forces, with the result of greatly improved availability of countermeasures in the ETO.

Dyer: Mr. Fraenckel went to General Spaatz's staff on April 1, 1944.
I hope Dr. Terman can furnish the additional information requested.

Fubini: Mr. Fubini is at AIL at present. He became a U. S. citizen on May 2, 1945.

Hulstede: Mr. Hulstede left RRL in approximately September 1945.

Litton: The "ZP-612" job referred to was a project of putting into production a 10 cm 1 kw magnetron designed by Dr. Tonks of the General Electric Research Laboratory. This tube is a very complex electronics device developed under wartime emergency conditions and the technical skill required to put it into very quick production was exceptional. Mr. Litton and his organization accomplished this task at a distance of 3,000 miles from the originating laboratory very satisfactorily. I hope Dr. Terman can supply information concerning Mr. Litton's background and connections with the Litton Engineering Laboratories.

Pettit: Mr. Pettit is now at Stanford University, having left RRL late in 1945.

Schelleng: I hope Mr. Moore can give you detailed information on Mr. Schelleng.

Sinclair: Mr. Sinclair came from General Radio Company in Cambridge, Mass., to the Radio Research Laboratory at a time when the Laboratory's program was developing rapidly. He became an expert on search receivers which were then very much in demand for the purpose of probing the enemy radar frequencies. He made outstanding contributions to this subject and subsequently took an assignment in North Africa with the first aircraft ferret in that theatre, as a result of which a great deal of field technical information came back to Radio Research Laboratory and entered into the design of new search receivers.

Skifter: Mr. Skifter joined AIL in April 1942 and is at present the Director of the postwar AIL Laboratory. This laboratory terminated its Division 15 business on August 31, 1945. Mr. Skifter was Dr. Hare's principal assistant at AIL and as such performed outstanding service in converting this wartime emergency laboratory from Division 6 work on submarine detection to Division 15 work on countermeasures. His great technical knowledge, combined with an unusually cooperative and pleasant personality, made it possible to convert this laboratory to a brand new field of technical wartime work in a remarkably short period.

Towner: I do not have the date on which Towner left AIL. At the time Division 15 took over AIL, Mr. Towner continued for a period of six months on submarine detection. He then went into the countermeasures work and played a principal role in the "Big Ben" project. He was in charge of this project and went with it to Great Britain in September 1944, staying until nearly the end of December of the same year. His performance on this emergency job was excellent and exhibited fine qualities of technical ability and leadership. I believe that Mr. Moore can add information concerning Mr. Towner's work and I am sure that his many contacts with Mr. Skifter will prompt additions to my thoughts concerning him, as well.

RESEARCH LABORATORY
GENERAL ELECTRIC COMPANY
SCHENECTADY, NEW YORK

JUL 15 1947

July 10, 1947

Col. W. S. Bowen
Office of Scientific Research
and Development
1530 P Street, N.W.
Washington 25, D. C.

Dear Colonel Bowen:

I enclose herewith some information which Dr. Terman has very kindly forwarded to me, concerning the individuals mentioned in your letter of July 3rd. I believe that this information, together with some which Mr. Moore is preparing, will complete the material which you requested in your letter.

Yours very truly,

Original signed by
C. G. Suits

CGSuits/ac

Attachment

cc: Mr. J. H. Moore
Dr. F. E. Terman

COPY FOR: Dean F. E. Terman.

July 15, 1947.

July 14, 1947

Dr. C. G. Suits
General Electric Research Laboratory
Number 1, River Road
Schenectady, New York

Dear Guy:

My copy of your letter to Colonel Bowen crossed my letter to you in the mails. This is just a note to bring to your attention the fact that I did not send Colonel Bowen a copy of my letter to you.

Accordingly, if you have not already done so, my letter or the appropriate information from it, needs to be forwarded on to Colonel Bowen.

Sincerely yours

F. E. Terman
Dean

FET:zmc

file

JUL 21 1947

COPY FOR: Doctor F. E. Terman.

July 15, 1947.

Colonel W. S. Bowen,
Office of Scientific Research and Development,
15 P Street, N. W.,
Washington 5, D. C.

Dear Colonel Bowen:

Relative to your letter of July 3 to Doctor C. G. Suits requesting additional information concerning certain individuals recommended for War Department awards, and in line with the suggestions of Doctor Suits in his reply of July 8, the following information is submitted concerning Messrs. Benning and Schelleng.

Benning (Doctor Suits has suggested that the following be used in place of the material on Benning contained in his letter).

Mr. Benning's work for Division 15, as a member of the Bell Telephone Laboratories, comprised a variety of special assignments associated with communications countermeasures besides the Pacific trip to which you have referred. Perhaps the largest contribution had to do with his studies of operational use of communication countermeasures, in cooperation with the Services. Of nearly equal importance was his work in evaluating various communication countermeasures techniques and equipments, particularly in relation to the vulnerability of the communication equipment used by the enemy. Mr. Benning also supervised the development of an airborne antenna ("stingaree") for communications jamming purposes and participated with the Airborne Instruments Laboratory in its adaptation for a high urgency countermeasures project of the "Big Ben" category.

Schelleng

Mr. Schelleng's work for Division 15, as a member of the Bell Telephone Laboratories, also was related to communication countermeasures. His principal contribution consisted of directing the development of several communication jamming equipments. He also rendered valuable assistance with various other phases of the countermeasures work; for example, the development of special modulation equipment for a high power communication jamming transmitter to permit adaptation of this device for use against the "Big Ben" type of weapon was completed in a very short interval of time, under his direction.

I trust that with the further aid of Doctor Terman ample information on the other individuals will be at your disposal.

Yours very truly,

J. Harold Moore.

c.c. to Dr. F. E. Terman
Mr. C. G. Suits

Stanford University Archives
SC 160 SERIES I
Box 3 Folder: 11

Post-War Files:
Oliphant, Charles
1946

file RRL

RADIO RESEARCH LABORATORY

HARVARD UNIVERSITY

MEMO TO: Dr. F. E. Terman

FROM: C. W. Oliphant DATE: January 31, 1946

SUBJECT:

Van Vleck read the article and reacted violently. We discussed it then and he showed some signs of changing his mind, though we left the discussion at the point where he would write you a note, sending it through me, as to his reasons why none of the atomic physicists that have worked on the A-bomb would support such an article. I shall by all means forward it on to you - probably with my rebuttal.

In brief, his argument was that theoretically if any loop-hole is left in the defense, enough bombs can be dropped through to make this a world which he would not like to live in. As far as I can tell, this is a standard physicist argument, - logical, but not considering the practical side of affairs at all.

P.S. Van was very constructive and very helpful about it.

file - RRL
1st draft

PROSPECTUS FOR POPULAR MAGAZINE ARTICLE ON A-BOMB COUNTERMEASURES

I. Titles

Atom Warfare: Measure-Countermeasure

Is There a Countermeasure for the A-Bomb?

How to Counter the A-Bomb

II. Author

The article would be signed jointly by: Dr. (civilian) possibly F. E. Terman,
Admiral (Navy) possibly _____,
General (Army Air Force) possibly
McClelland.

Below the actual signatures would be the phrase "As told to Charles W. Oliphant".

Since the public has been persuaded by the popular press that there is no countermeasure to the A-bomb, this article must bear the signatures of outstanding authorities in the countermeasures field in order, first, that it be accepted for publication, and second, that it inspire the reader with greater confidence in the conclusion.

III. Explanatory Insert Box

The lead page of the article would contain an explanatory note covering the following items:

Pictures of the three authors plus background statements qualifying them as experts in the countermeasures field.

The statement that none of the authors are atomic physicists and do not attempt to pose as experts in that field.

A statement that this articles does not touch on or attempt to solve national or international political problems resulting from the use of nuclear energy.

A statement to the effect that "As fear is a motivating force in arousing public interest and attention to the solution of nuclear energy problems, this article is not intended to cancel these fears and detract from the accomplishment of reasonable objectives. Rather, it is intended to make public the degree to which countermeasures can be applied to nuclear weapons; in this way, mass fear achieves a more rational basis".

IV. Outline of Article

A. Lead Paragraph

Words to the effect: Can the atom bomb be countered? Yes, possibly it can. This in spite of published reports to the contrary.

B. Second and Third Paragraphs

Point out that: Almost without exception, the public has been lead into two major traps by previously published articles on atomic bombs. First, each of these articles was highly partisan, directing public opinion toward some specific end. Second, each of these articles extrapolated freely from known and perfected weapons of the present day to unknown and projected weapons of the future.

All of these articles followed a common approach which was to make a series of statements invariably including: "For the atomic bomb, there is no countermeasure". Following this series of statements, there is a psuedo-deduction and conclusion. Commonly, the same statements are used to prove such widely divergent deductions as:

Mankind is doomed--too bad.

Science is bad, let's have less of it.

Science is good, let's have more of it.

Statecraft is man's only salvation.

We are all going to die, let's not have an Army and Navy.

ATOM WARFARE: MEASURE - COUNTERMEASURE

by
Dr. F. E. Terman
and
Charles W. Oliphant

presumtive, of course, and subject to your ok.

Can the atom bomb be countered? Yes, probably it can. Begin-

RADIO RESEARCH LABORATORY
HARVARD UNIVERSITY

MAR 22 1946

MEMO TO:

FROM:

DATE: 3/20/46

SUBJECT:

Dear Dr Terman,

Thanks you for the note. Here is the latest in the way of a prospectus, consisting of rough draft in the first part & outline in the second.

? = doubt about including.

| = emphasize this says Jack Alexander of Post.

|| = much emphasis etc.

Body of article will be the C M s themselves.

Would like to have your comments whatever they may be.
Hope to have first draft by March 25.

Regards. Charles.

is plainly nothing more than a hard-hitting, hard-headed science — a science concerned with material means for reducing the effectiveness of enemy weapons. Not at all limited in scope, it is a broad science generally applicable to any weapon. As an insurance policy, it serves well in time of peace. In war, it is a highly valued weapon of defense.

ATOM WARFARE: MEASURE - COUNTERMEASURE

by
Dr. F. E. Terman
and
Charles W. Oliphant

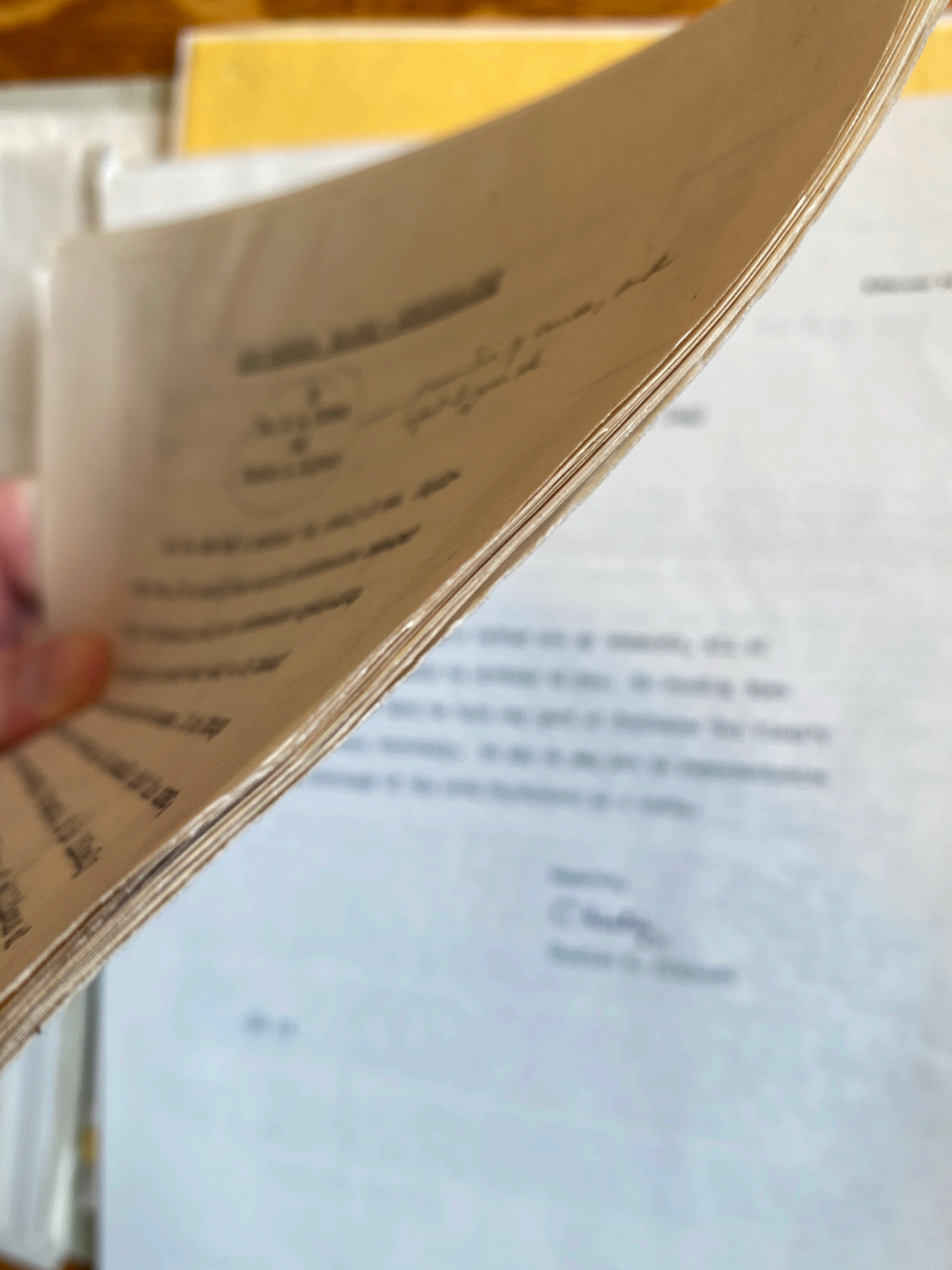
presumtive, of course, and subject to your ok.

Can the atom bomb be countered? Yes, probably it can. Beginning now, if we carefully foster scientific countermeasures research and, at the same time, carefully plan a countermeasures organization, it is certain that U.S. ingenuity, drawing heavily on its present store of war secrets, can come up with the answer. In the strange and uncomforting time of the atomic age, it is possible that the answer, itself, may be strange and uncomforting. For example, it is likely that a roaring, two-fisted, atomic war might kill tens of millions of U.S. citizens, destroy industrial plants spread over thousands of square miles, but the proper countermeasures and the proper countermeasures organization at that time would mean the difference between U.S. survival and U.S. assimilation by a hog-mouthed, omnivorous enemy.

Far from the belief of some, countermeasures is not a by-product of war but the very essence and root of battle. In point of fact, the outcome of many battles can be predicted from the relative calibre of the two opponents' countermeasures. What, then, is this thing called, countermeasures?

Is it the magic wand that turns back a bullet? ^ No! Countermeasures is plainly nothing more than a hard-hitting, hard-headed science — a <u>science concerned with material means for reducing the effectiveness of enemy weapons</u>. Not at all limited in scope, it is a broad science generally applicable to any weapon. As an insurance policy, it serves well in time of peace. In war, it is a highly valued weapon of defense.

Is it the mythical death ray that melts an airplane?



MAR 13 1946

RADIO RESEARCH LABORATORY

HARVARD UNIVERSITY, 18 DIVINITY AVENUE
CAMBRIDGE 38, MASSACHUSETTS

OPERATING UNDER THE SUPERVISION
OF THE
OFFICE OF SCIENTIFIC RESEARCH
AND DEVELOPMENT

KIRKLAND 7560

March 11, 1946

Dr. F. E. Terman, Dean
School of Engineering
Stanford University
Palo Alto, California

Dear Dr. Terman:

Enclosed with Van Vleck's letter are my comments, all of which will undoubtedly be obvious to you. On reading them over, I find it hard to take any part of Professor Van Vleck's criticism very seriously. He may or may not be representative in his feelings of the Avon Physicists as a whole.

Regards,

Charlie

Charles W. Oliphant

CWO lt

JEFFERSON
PHYSICAL
LABORATORY

THE PHYSICS LABORATORIES
HARVARD UNIVERSITY
CAMBRIDGE 38, MASSACHUSETTS

March 8, 1946

Dean F. E. Terman
School of Engineering
Stanford University, California

Dear Fred:

Charlie Oliphant has asked me to read a draft of the proposed article on "Measures vs. Counter Measures" and, after perusing it, I have asked his permission to transmit my impressions to you. I am sending this letter via him in order that he may have a chance to take exception to any of the views expressed in this letter.

Frankly, I am rather surprised that you would want to write an article of this kind and especially that you would do so without getting the reaction of some of the top men in the field of nuclear physics--Fermi, Rabi, Condon, Lawrence, Oppenheimer, etc.--men who have thought a great deal about the technical and political problems involved. Of course, I do not for a moment want to imply that one should not state freely what one believes to be the truth. However, your position as a scientist is so strong that I should not think you would want to take a stand which may be out of line (I think it is, but I may be wrong) with that of most of the leading figures in the field without thinking over the matter carefully. (1)

The article seems to me somewhat misleading. The impression of the superficial or average reader will be that of a false sense of security and that there is a real defense against the atomic bomb. The real thesis of the paper seems to be that granted we may lose potentially tens of millions of people in a surprise attack, nevertheless, by arming to the teeth, what would remain would be so strong that no one would dare attack us. (2) This argument appears unconvincing to me, for the whole course of history has revealed plenty of wars when the margin of superiority was ostensibly even more overwhelming. The prospect of living in a highly militarized civilization is not a pleasant one even without an atomic war, and were one to start, I think I would just as leave be dead as one of the survivors. (3) (4) Of course, if U.N.O. fails, we may be driven to about this, but it is a grim prospect. (5)

R.R.L. is becoming a more doleful place every day. The cafeteria closes today and, consequently, I have a feeling that my trips to the biology building are practically at an end. Sutherland, therefore, classifies me as a "rice Christian."

With best regards,

Cordially,

Van

JHVV/hm

J. H. Van Vleck

COMMENTS ON LETTER FROM J. H. VAN VLECK TO F. E. TERMAN, MARCH 8, 1946

By C. W. Oliphant

1. They have thought a great deal about the physical problems of building A-bomb. On that subject they are experts.

   Their political thinking is emotional.

   Thus, their thoughts about CM are (a) not grounded in experience, (b) highly tinged by the conclusions of their "political" thinking. Their conslusions aren't particularly relevant.

2. The thesis of the paper is not: How to prevent another war (i.e. by having such a strong defense "that no one would dare attack"), but rather: How the U.S. can survive (maintain its national integrity) through another war - by the use of Countermeasures.

3. A militarized civilization is not a prospect of the future; it is a fact of the present. Whether this fact is pleasant or not has no bearing on the article.

4. In effect Van says, "I would prefer not to <u>live</u> in a world where atomic wars can start." As of August 1945, his preference became immaterial. For the present, and very likely some time to come, depending on the success of UNO, he is living in a world where atomic wars <u>can</u> start.

5. Atomic war is a grim prospect...true. The proper CM can make it less grim, but, more important, they can let the U.S. survive and make still another try for universal peace.

March 30, 1946

- 2 -

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...tive as they are,

RADIO RESEARCH LABORATORY

HARVARD UNIVERSITY

Too flowery - too wordy
CM is what can we do
to lessen - a topic
overlooked in all store

MEMO TO:

FROM:

DATE: 4/4/46

SUBJECT:

Dear Dr Terman,

This is the first full length rough draft. I fear it is very rough and a little bit dull in the section on Direct & Indirect CM's - pages 13-22. Have you any suggestions, or will simply smoothing the thing out help matters.

What is your general impression of the article as a whole?

The family is getting along well.

Regards,
Charles.

I note your report about the state of R.R.L., which means that apparently the demobilization is going right ahead. As you say, it must unquestionably be a doleful place, but I think that we can be thankful that it is possible to let it die now, and can hope that it will not be necessary to revive this particular activity to meet any emergency in the future.

March 30, 1946

Sincerely yours,

F. E. Terman
Dean

Dr. J. H. Van Vleck
Physics Department
Harvard University
Cambridge 38, Mass.

Dear Van,

Your letter giving your reactions to Charlie Oliphant's proposed outline is very much appreciated.. As you know I am always glad to have suggestions and criticisms from you as I found your views uniformly helpful.

I am however not entirely certain that I can agree fully with you in every aspect. In reading your article I get the impression that to some extent you have the feeling that if there is to be an atomic war life wouldn't be worth living anyway and that therefore there is no use of giving any thought to what should be done to reduce our losses in such a war.

I agree with you that the only real salvation is a United Nations Organization that really functions. At the moment it is unfortunately questionable if we have one that will meet the requirement, and it is entirely conceivable that the world may have to go through one atomic war before the lesson is learned, although this is certainly an unpleasant prospect.

Countermeasures can not of course provide full protection against an atomic bomb. However it is entirely possible that a countermeasures program effectively planned could make the difference between the destruction and the survival of the nation in the event an atomic war broke out. It would accordingly seem that as long as we are maintaining any type of military establishment for our own protection, and have not gotten to the point where we are putting complete reliance upon the protection afforded by the United Nations, then the available countermeasures, ineffective as they are, should be pushed.

I note your report about the state of R.R.L., which means that apparently the demobilization is going right ahead. As you say, it must unquestionably be a doleful place, but I think that we can be thankful that it is possible to let it die now, and can hope that it will not be necessary to revive this particular activity to meet any emergency in the future.

Sincerely yours,

F. E. Terman
Dean

FET:fm

cc: C. W. Oliphant

P.S: Have you heard that the Airborne Radio Division of N.R.L. with sixty-one carloads of R.R.L. capital equipment is to be at Moffett Field?

April 3, 1946

Charles Oliphant
Radio Research Laboratory
Cambridge, Mass.

Dear Charlie,

I should have written you sooner regarding the atomic bomb paper but various things have interfered with my getting my reaction properly organized.

My first reaction is that the text lacks some of the punch and freshness which characterized the outline, and is wordy. The material that you sent also takes three thousand words to get well warmed up on the subject whereas Mr. Alexander had suggested a total length of four thousand words if possible. It would seem to me that this presentation could be greatly improved by being boiled down to one-half or one-third of the length, saving only the most effective ideas and phrases, and being made somewhat more concise.

In a way the first ten pages lacks a simple theme and perhaps goes too much into the details of what countermeasures are, from the cave man on. It seems to me that the story you have to tell is built around the fact that countermeasures for the atomic bomb are the matter of organizing and planning the best possible defense against atomic warfare, and because of the peculiar nature of atomic war the type of defense required has many special features not present in conventional warfare, and in general requires intensive and highly technical preparation in peace time.

The theme which I think is unassailable even on the part of people who feel that the only salvation is a world federation runs something as follows: First as long as we feel it necessary to have a national defense organization of any kind, i.e. until we can disband our army and navy completely except as an internal police force, and rely on a United Nations military force then we must give thought to defense against atomic bombs. Otherwise why pretend that one has a national defense when the only significant weapon that we can be called upon to defend ourselves against is the atomic bomb. Second in defense against atomic warfare countermeasures are at leas as important as any other single element and perhaps more important than all other elements put together. Third countermeasures can reduce our losses in an atomic war even though countermeasures do not protect us against damage and suffering from the use of atomic energy in warfare--(it is too much to hope that any magic method will be evolved that will detonate atomic bombs as they approach

our shores, just as we have never succeeded in developing any method of exploding TNT bombs prematurely). The countermeasure here is to prevent the bombs from ever being dropped in our direction. The type of benefit that countermeasures can produce may likely be only the difference between losing all of our fleet and losing half, of having fifty million people killed as against perhaps ten to twenty million people killed, losing all our capacity for defense as against still having some defensive power left after the first twenty-four hours. Fourth this reduction in loss while not very comforting, it can easily make the difference between national survival and national destruction. Fifth it needs to be emphasized that countermeasures in warfare carried on with atomic speed must operate on a war basis in peace time. Finally sixth it is to be noted that countermeasures are purely a defensive, and do not provide an offensive threat.

A countermeasures organization seems to me to contain three basic components. There is first the intelligence function--the gathering of information and the evaluation and interpretation of this information so obtained. In this connection I would not overplay the espionage aspect because I think it has a nasty taste in peoples mouth--we do employ agents but we do not like to admit publically that we do. The second aspect is scientific research, concerned with development of new or better techniques for using countermeasures. Such research must be given full access to intelligence information, given the opportunity to make its own independent evaluations, and also must work closely with the operations. Third there is the operational organization, which includes the military planning for applying countermeasures, which carries out the continuous military watch that is required in peace time to reduce the element of surprise, and which carries out continuous maneuvers of attack and defense that continually check the effectiveness of the countermeasures organization also results in improved tactics. It will be noted that these three points were all missing at Pearl Harbor, and that debacle which could have been avoided if either points one or three had been functioning effectively.

One of the points that I believe should be brought out rather emphatically under the heading Indirect Countermeasures is the necessity of providing a mechanism whereby the country can function temporarily on a decentralized basis without waiting for a new central organization to be developed. For example if an atomic bomb went off in Washington and eliminated the president, the cabinet, congress, the Pentagon building, the Navy building and the Chiefs of Staff building it would be absolutely necessary for the country to continue operating on a military basis in a decentralized manner with the commander in each area using his own best judgment in functioning as an independent military force, and with perhaps each surviving governor temporarily handling the civilian functions in his own state and any neighboring states that might have lost their top organizations.

Insofar as the UNO is concerned, none of the above affects adversely the desirability of a world organization, whatsoever, beyond pointing out that things are going to be pretty grim if war breaks out because of the failure of UNO.

I have spoken frankly because I know that I can do so with you after the years that we worked together, and you would want my quite frank reaction.

It may be that my comments are in a direction in which you do not wish to have the article go. This is all right because they are still perfectly good comments, and are given with the realization that the subject of the atomic bomb and counter-measures related thereto covers so much ground that in four thousand words one must pick and choose, and leave out most of the possibilities that could be discussed.

Sincerely,

F. E. Terman
Dean

FET:fm

ATOM WARFARE: MEASURE - COUNTERMEASURE

By

Dr. F. E. Terman
and
Charles W. Oliphant

Can the atom bomb be countered? Yes, probably it can.

Beginning now, if we carefully foster scientific countermeasures research and, at the same time, carefully plan a countermeasures organization, it is certain that U.S. ingenuity, drawing heavily on its present store of war secrets, can come up with the answer. In the strange and uncomforting time of the atomic age, it is possible that the answer, itself, may be strange and uncomforting. More than likely a roaring, two-fisted, atomic war would kill tens of millions of U.S. citizens, destroy industrial plants spread over thousands of square miles. But the proper countermeasures and the proper countermeasures organization, at that time, would mean the difference between U.S. survival and U.S. assimilation by a hog-mouthed, omnivorous enemy.

Far from the belief of some, countermeasures is not a by-product of war but the very essence and root of man's struggle to survive. In point of fact, the outcome of many battles can be predicted from the relative calibre of the opposing countermeasures. What, then, is this thing called countermeasures?

Is it the magic wand that turns back a bullet? Is it the mythical death ray that melts an airplane and frys the pilot? No! Countermeasures is plainly nothing more than a hard-hitting, hard-headed science -- <u>a science concerned with material means for reducing the effectiveness of enemy weapons.</u> Not at all limited in scope, it is

Roland Kinney -

RADIO RESEARCH LABORATORY
HARVARD UNIVERSITY, 59 CLINTON AVENUE
CAMBRIDGE 38, MASSACHUSETTS

April 25, 1946

Mr. Charles W. Oliphant
Radio Research Laboratory
Harvard University
Cambridge 38, Massachusetts *

Dear Charley,

My letter commenting on the first part of your Atomic Countermeasures paper crossed the full length manuscript in the mails, as you know. I read the entire paper rather promptly but have been slow about writing because it seemed that the comments that I made on the first portion pretty much apply to the rest of the material that you have compiled.

My general reaction is still that the account is too long and perhaps too wordy, if this means anything different than length, and that it has somehow lost some of the punch of the outline.

A further thought that was perhaps only unclearly expressed in my previous letter is that the central theme of the paper should be "not are there countermeasures for the atomic bomb"--but rather, "what can we do now, and also later, to minimize the danger that we would suffer if an atomic bomb warfare would break out?" This, of course, is countermeasures in a broad way, but you have covered it from the point of view that countermeasures is something special. The complete defense we would put up includes what you and I commonly think of as "countermeasures", as only one part.

It seems to me that this subject of what one can do, i.e. what is the best that can be made of what is admittedly a bad situation, is a topic that has been overlooked in all of the furor that has arisen over the "secret" of the atomic bomb, and the necessity of a United Nations program, etc.

Present indications are that I will be in the East for a while, arriving late in June. If you are in Cambridge at that time I will look forward to seeing you, for although there is no RRL business that demands my attention, I would certainly come to Boston for sentiment's sake if M. I. T. and Harvard did not have enough activity to interest me professionally.

Sincerely,

F. E. Terman
Dean

FET:hl

MAY 6 1946

RADIO RESEARCH LABORATORY
HARVARD UNIVERSITY, 18 DIVINITY AVENUE
CAMBRIDGE 38, MASSACHUSETTS

OPERATING UNDER THE SUPERVISION
OF THE
OFFICE OF SCIENTIFIC RESEARCH
AND DEVELOPMENT

KIRKLAND 7660

May 2, 1946

Dr. F. E. Terman, Dean
School of Engineering
Stanford University
Palo Alto California

Dear Dr. Terman:

Thank you for your two nice letters commenting on the article. I am very appreciative of the constructive criticisms which you offered. There is apparently no significant difference in our views.

At the present time the article is not much further along than the first full length draft which I sent you. I was hoping that the story could be completed before the arrival of our son, Eric. Actually, it was finished up before he and Arlene came home from the hospital. After that time, it became increasingly difficult to work on the article. By now final exams are in the offing and the article must be temporarily shelved.

It occurred to me that the article is a difficult one to write, and that I have not succeeded too well in presenting the material for publication in the Saturday Evening Post. This summer, I should like to make one more try at the task, if for no other end result than my own amazement.

If we are still in Cambridge when you arrive, we would be very happy to see you. Our present plans, however, are to depart for Los Angeles the first or second week in June. During the summer we may live in Los Angeles while I go to summer school, probably at Cal Tech.

Please give my regards to the old RRL gang.

Sincerely,

Charles W. Oliphant
LT

Charles W. Oliphant.

CWO lt

May 6, 1946

October 15, 1946

Mr. Charles W. Oliphant
Radio Research Laboratory
Harvard Universtiy
Cambridge 38, Massachusetts

Dear Charley,

I was glad to receive your letter this morning. I can well imagine that the arrival of Eric upset your schedule, but hope that you can get back to the article in time.

From your plans, it looks as though I will almost certainly miss you in the East since I will definitely not arrive in Cambridge before June 27 or 28, and perhaps not until July 1. If you are to be in Los Angeles, however, please let me know what your address there will be, and keep me informed as to when you are planning to go. I may wish to write you, and there is always the possibility that I might be in Los Angeles, although at the moment I have no trip planned beyond the one East and one late in the summer to Seattle.

In connection with the atomic bomb, it has recently come to my attention that the destructive radius of the bomb, as dropped at Hiroshima, was much greater because of the fact that the bomb exploded above the earth than would have been the case if the bomb had exploded at the surface. This is of perhaps some significance since it means that the danger of a suitcase type of espionage operation will be less substantially than that of a bomb properly dropped from an airplane. Of course, the destruction in the immediate vicinity of the bomb exploded on the surface would be greater than of the bomb exploded at elevation, but the coverage would be distinctly less.

I had an interesting guest yesterday. One of my close college friends who I discovered was on the official committee appointed by the Air Forces to evaluate the damage done by strategic bombing in Europe dropped in (you have probably seen reference to their report in "Time"), and he is now just back from six months in Japan on a corresponding mission. He is an associate research director for Standard Oil of New Jersey and headed a group concerned primarily with the chemical industries. It was interesting to note that he said Hiroshima looked just like any other Japanese city that had been bombed, and that the one atomic bomb that was dropped did about the same damage as one large air-raid concentrated on the same area, even though the energy of the atomic bomb was greater.

Sincerely,

F. E. Terman
Dean

FET:hl

October 15, 1946

Mr. Charles W. Oliphant
15 Brattle Circle
Cambridge, Massachusetts

Dear Charley,

I have now received some reprints of the article that appeared in SCIENTIFIC MONTHLY on the "Mathematics of Committees, Boards, and Panels." This will save your looking up the magazine, and I am sure you will get a chuckle out of the account.

I would like it back, as my supply is quite limited and I would like to re-circulate to others the copy being sent to you.

Sincerely

F. E. Terman
Dean

1 Encl.
Reprint of article

November 27, 1946

Mr. Charles Oliphant
15 Braddle Circle
Cambridge, Massachusetts

Dear Charlie:

I was very glad to find that the dinner date Sunday evening, December 15, is satisfactory and I will be looking forward to seeing you then. I will contact you sometime before that evening to arrange details for getting together.

Thanks for the various news items, which I will not comment on since it will be easier to talk about things when we get together.

Sincerely yours

F. E. Terman
Dean

FET:zmc

Stanford University Archives
SC 160 SERIES I
Box 3 Folder: 12

Post-War Files: R.R.L.
1946-47

T E L E G R A M

11 December 1945

MR. EARL CULLUM
STATLER HOTEL
WASHINGTON, D. C.

PHONE CONVERSATION WITH BUSH VERY SATISFACTORY. HE FAVORS PUBLICATION BY COMMERCIAL PUBLISHER AND IF HARVARD TURNS DOWN AUTHORIZATION ALTERNATIVE SPONSOR WILL BE FOUND. HE INDICATED DECIDED IMPATIENCE WITH HARVARD ON MATTERS LIKE THIS. WE ARE TO COMPLETE REPORT WITHOUT DELAY AND WORK CLOSELY WITH BURCHARD.

FRED TERMAN

NL
FET/w
Chg: 322

(Sent 4:30)

N.L.
January 25, 1946
Rare Book
Special Collections
Northwestern University Library

FEB 15 [illegible]

RADIO RESEARCH

Miss Elizabeth Hubbard
Radio Research Laboratory
Harvard University
Cambridge 38, Massachusetts

Budget

February 15, [illegible]

Dear Miss Hubbard:

I believe that some
conversation might
profitably be held
regarding the
budgeting of
laboratory
expenses in the
future. Perhaps
you could
arrange to
have someone
call on me
at your
convenience.

Very truly yours,

KIRKLAND 7660

RRL -

Harvard University Address
Cambridge 38
Scientific

CRUFT LABORATORY
HARVARD UNIVERSITY

FEB 25 1946

February 21, 1946

Dr. F.E. Terman
Dean, School of Engineering
Stanford University
Palo Alto, California

Dear Fred:

This will let you know that the sound film we sent via express addressed to you yesterday. The titles were added yesterday afternoon, special handling and sent forward last Tuesday.

Both these films should be returned to Mr. D.W. Lovell, Office of War Archives, O.S. Library Center, Cambridge, Mass. Mr. Lovell will take over the handling of this material and I believe Bob Saltonstall and Don Fearis are the most people lined up to make use of it.

Sincerely yours,

Roger

R.W. Fleming

RWF:mdb

SHIPPING ORDER

RADIO RESEARCH LABORATORY
HARVARD UNIVERSITY
DIVINITY AVENUE, CAMBRIDGE 38, MASS.

SHIP TO:

Dr. F. E. Terman
659 Salvatierra Street
Stanford University
Palo Alto, California

ATTENTION OF:

SHIPPING ORDER NO. 10,846

DATE February 20, 1946

VIA Air Express

CHARGES $

VALUE 50.00

QUANTITY	ITEM NO.	DESCRIPTION
1		Roll of RCM Film

Receipt No. 24000

RRL ORDER NO._____ U. S. NO._____

RECEIVED FOR CONSIGNEE BY:

_____

DATE_____

SHIPMENT AUTHORIZED BY M. L. Cox

APPROVED FOR ACCOUNTING DEPT. R. A. Horvath

SHIPPED BY L. Gilat

DATE 2/20/46 WAY BILL NO._____

NO. PIECES 1 WEIGHT_____

CONSIGNEE — PACKING SLIP

file - RRL.

SECRET

RADIO RESEARCH LABORATORY
HARVARD UNIVERSITY, 18 DIVINITY AVENUE
CAMBRIDGE 38, MASSACHUSETTS

KIRKLAND 7660

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OFFICE OF SCIENTIFIC RESEARCH
AND DEVELOPMENT

March 8, 1946

FEB 20 1946

JEFFERSON
PHYSICAL
LABORATORY

THE PHYSICS LABORATORIES
HARVARD UNIVERSITY
CAMBRIDGE, MASSACHUSETTS

February 16, 1946

Dean F. E. Terman
School of Engineering
Stanford University
California

Dear Fred,

This will be just a very brief note to reassure you that the slides and film will be sent out to you leaving here Monday or Tuesday, February eighteenth or nineteenth. I shall drop you a line saying how they are going after they are actually started.

I was very much interested in hearing of the number of R. R. L. alumni that have already turned up on the West Coast. You will have to have reunion meetings!

Sincerely yours,

Roger

R. W. Hickman

RWH:CR

file - RRL.

SECRET

RADIO RESEARCH LABORATORY

HARVARD UNIVERSITY, 18 DIVINITY AVENUE
CAMBRIDGE 38, MASSACHUSETTS

KIRKLAND 7660

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OF THE
OFFICE OF SCIENTIFIC RESEARCH
AND DEVELOPMENT

March 8, 1946

Dr.
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RECEIPT FORM D 24000

Date February 20, 1946

for CLASSIFIED Material addressed to Dr. F. E. Terman

659 Salvatierra Street

Stanford University, Calif.

I have personally received from M. E. Ladd, Document Room
(Address) RADIO RESEARCH LABORATORY, Harvard University,
Cambridge, Massachusetts, the ~~CLASSIFIED~~ Material identified below. I assume full responsibility for the safe handling, storage, and transmittal elsewhere of this material in accordance with existing regulations of OSRD, the War Department or the Navy Department, whichever is pertinent. The ~~CLASSIFIED~~ Material, including enclosures and attachments is identified as follows. (In identifying ~~CLASSIFIED~~ Material avoid any reference which might cause the receipt form to become ~~CLASSIFIED~~.)

DESCRIPTION

Indicate whether material is letter, report, etc., type,* and reference or file number to identify it.

On Loan:

Navy-211 copy #1

(To be returned to R. W. Lovett, Office of War Archives, Littauer Center, Harvard University, Cambridge, Mass.)

mle

* Type: SO-Signed Original, CC-Carbon Copy, PC-Photostat, TC-Typed Copy.

Signed ..... for .....

Title ..... Date .....

ORIGINAL

SECRET

file - RRL.

RADIO RESEARCH LABORATORY

HARVARD UNIVERSITY, 18 DIVINITY AVENUE
CAMBRIDGE 38, MASSACHUSETTS

OPERATING UNDER THE SUPERVISION
OF THE
OFFICE OF SCIENTIFIC RESEARCH
AND DEVELOPMENT

KIRKLAND 7660

March 8, 1946

Dr. F. E. Terman, Dean
School of Engineering
Stanford University
Palo Alto, California

Dear Fred:

We are sending you by security express prepaid on Waybill No. 3-361, 1 box containing all of the documents and papers in your office file. Two copies of the related Shipping Order are enclosed and I would appreciate your receipting and returning one for our records. I also enclose two lists of the papers and documents and would appreciate your fastening to one an agreement of loan in some form such as the attached draft, returning same to me for transmittal to Mr. Lovett, at the time we make our accounting to him for all Archives Documents.

I understand that you have certain documents in addition to those listed here, and suggest you add the numbers and titles in the appropriate places on the loan form.

I presume you will keep the STR, Parts I and II, which have been sent to you. We will also send you the remaining Interim Reports as prepared, and a copy of your Administrative Report. If there is anything else you would like to complete this collection, please let me know.

Yours sincerely,

N. Preston Breed,
Business Manager.

NPB lt

SECRET

Notice:-This document contains information affecting the national defense of the United States within the meaning of the Espionage Act (U. S. C. 50:31, 32). The transmission of this document or the revelation of its contents in any manner to any unauthorized person is prohibited by law.

COPY

STANFORD UNIVERSITY
SCHOOL OF ENGINEERING

OFFICE OF THE DEAN

STANFORD UNIVERSITY, CALIFORNIA

May 28, 1946

TO WHOM CONCERNED--HARVARD OFFICE OF WAR ARCHIVES:

Mr. Preston Breed, Business Manager
Radio Research Laboratory
Harvard University
Cambridge 38, Massachusetts

Dear Preston,

Enclosed herewith is a copy of shipping order regarding documents and papers, together with one list of the papers and documents for your records. With respect to the latter, I have added on page 40-41 the list of reports that I already had in my possession as a result of reports that were mailed to me after returning to California, plus several reports that I was making reference to at the time of my return and, therefore, brought with me.

I realize these should have been sent to you earlier but when the shipment arrived I put the papers aside in the hope that when setting things up with the Hoover Library I would know what the latest classification of the various reports was.

It has seemed unwise to wait any longer in view of closing down at RRL. But if you do have any information as to what happened to the recommendation that Oliphant and the committee made regarding classification I would appreciate having it.

Sincerely,

F. E. Terman
Dean

FET:hl

nD1

May 28, 1946

TO THE CUSTODIAN--HARVARD OFFICE OF WAR ARCHIVES:

This will confirm that I have in my possession and will be personally responsible for the documents and papers listed on the forty-one sheets attached, being a substantially complete set of Radio Research Laboratory published reports. I have arranged for adequate safe-keeping of the material and for its return to you, either, on your request, or, on my inability properly to care for it.

F. E. Terman

November 21, 1946

November 21, 1946

Mr. John Dickson
Managing Editor
The National Cyclopedia of American Biography
101 Fifth Avenue
New York City

Dear Mr. Dickson:

In reply to your letter of November 13, 1946, I am enclosing three documents which will probably be of interest to you in connection with the Radio Research Laboratory's activities during the war.

Yours very truly

F. E. Terman
Dean

4 Encls.
"How Radar Countermeasure Work"
"War in the Ether"
Pamphlet, "Electronics Warfare"

FET:ZMC

July 8, 1947

Dr. C. G. Suits
Research Laboratory
General Electric Co.
1 River Road
Schenectedy, N. Y.

Dear Guy,

I have a copy of Colonel Bowen's letter to you, and since some of the information he asks for I can give easily or at least tell you where it can be found I am dictating this and transmitting to you to save time.

Best personal regards.

Yours very truly,

F. E. Terman
Dean

FET:lfm

Information on Radio Research Laboratory Men

Alford: Present business address is 346 Somerville Ave, Somerville, Massachusetts. Alford's home address is Commander Hotel, Cambridge, Mass.

Byrne: Byrne was among the first three men to report to RRL for work and stayed with the laboratory until approximately January 1, 1946. His termination cannot be exactly stated because it involved a tapering off period that ran through December and January, during which he had a certain residual responsibility that were being discharged. Byrne began as a group leader at the Radio Research Laboratory, and in the summer of 1943 was made Executive Engineer of the laboratory. In 1945 he was made an Associate Director. As a group leader he was responsible for the group that developed the Mandrel and Dina jamming transmitters, both of which were manufactured in substantial quantity and found effective use in the war. As Executive Engineer he coordinated most of the laboratories technical activities, including in particular coordination of the Elephant program, the last major job carried out by the laboratory.

Cahill: Cahill joined the Radio Research Laboratory in March 1942 and terminated his connection approximately Dec. 1, 1945. He was Associate Technical Director of ABL from June 1944 until the end of April 1945. For four months beginning December 1943 he was in the Southwest Pacific as technical observer with the first Ferret plane to operate in that theatre, and brought back information that was of fundamental importance in planning the countermeasures program for the Southwest Pacific theatre. While not on foreign missions, Cahill was in charge of the anti-jamming division at the Radio Research Laboratory, which did important work in investigating and evaluating the vulnerability to jamming of our equipment, and what could be done about it. His work and that of his associates on anti-jamming represented the most systematic and complete survey of our own situation with respect to possible enemy countermeasures that was carried on in this country during the war. Cahill is now at AIL and is in charge of receiver research.

John Chase was Associate Administrative Director of ABL. He went to Europe in June or July1944 and remained with ABL approximately one year, until ABL demobilized. Chase was never connected with RRL except through his ABL position. His services were extremely important, as they included much responsibility for program planning, setting up the Paris laboratory used both by ABL and BBRL, representation of both BBRL and ABL in many administrative problems involving dealings with the American and British agencies (both civilian and military), etc. Chase was in very close touch with all ABL technical activities, and spent a considerable amount of time in the field, particularly on the continent. He was riding with Caufield at the time the latter was killed, and in fact received a minor scratch from a shell fragment at this time.

Cullum: Cullum was with RRL from about August 1942 until the laboratory was demobilized. His official termination began in December 1945 but he continued to discharge some RRL duties until February 1946. From the early part of 1943 onward, Cullum was Associate Director of RRL, and from the latter part of 1943 onward was the senior Associate Director, which made him second in command at the laboratory. From about December 1942, Cullum was likewise a consultant to Dr. Bowles office. His particular administrative responsibility at the laboratory was the maintenance of coordination between the laboratories technical activities and outside agencies, including Army and Navy, and also manufacturers who were producing equipment in which the laboratory had a technical interest. As second in command, Cullum had a corresponding influence on all internal RRL policies and operations. Perhaps the most important single service that he rendered in the war, was the contribution he made working jointly for RRL and as a consultant to Dr. Bowles toward solving the problem of expediting shipment of countermeasures equipment to the European theatre for use of our air forces. It was the success of this activity that made it possible to equip the 8th Air Force completely with countermeasures equipment in the fall of 1944, and thereby to reduce plane losses very substantially by rendering completely ineffective the German radar directed anti-aircraft defenses. Cullum spent 7 weeks in England in September-November 1944 at Dr. Bowles request, and was also a member of the Petticoat mission that went to England in May 1944 to get countermeasures equipment installed on the invasion fleet.

Dyer: The exact date that Dyer succeeded Fraenckel as head of ABL-15 can be obtained from Fraenckel, but was probably March or April 1944. Dyer returned from England in June 1945 when ABL was dissolved. He was one of the early employees of RRL, joining the RRL staff in April 1942, and continued with RRL until demobilization in late 1946. At RRL Dyer was the head of the transmitter group that developed the Carpet (APT-1) and high-power carpet (APQ-9) transmitters that were the basis of the highly successful jamming operations of the 8th and 15th Air Forces. Upon returning from England, Dyer was put in charge of the coordination of all RRL technical activities that relationed to the Pacific theatre. Dyer, as you know, was a hard driving individual who rolled up his sleeves and worked right with the boys, doing more than anyone else. Thus he had a personal hand in the equipment developed by his group, and similarly during his period as head of ABL he was personally involved in virtually all ABL activities.

Fubini: Fubini is still at AIL. I am not sure regarding his citizenship but believe it almost certain that he has now been naturalized. In any event the information can be easily obtained directly from him by telephone.

Hulstede: Hulstede was with the Radio Research Laboratory until November 1945, after joining the laboratory in the spring of 1942. He became the head of the receiver division and was intimately connected with practically all receiver developments that were carried on in the laboratory. The APR-5 and 6 receivers were based on the oscillator he developed with his own hands.

Litton: Although he was not a member of RRL I can give the following about Litton: He received his Bachelor's degree from Stanford in 1924 and the degree of Engineer the following year. He then worked with Bell Telephone Laboratories, later was head of the tube department of the Federal Telegraph Company, and in 1932 formed the Litton Engineering Laboratories. Among other things, his organization supplied a substantial part of the glass working equipment such as glass blowing lathes, vertical seal machines, etc., used in the construction of special transmitting tubes, including radar tubes, that were built during the war. He reduced the ZT612 tube from a laboratory device showing great promise, but which did not yet incorporate in one tube all of the desired properties, to a commercial tube, and did so in a remarkably short time, particularly in view of the complexity of the device, and the difficulty of the problems involved.

Pettit: He was at the Radio Research Laboratory from July 1942 until December 1945. Pettit went to CBI as chief civilian consultant to the 20th Air Force in its initial RCM operations being overseas from April 1944 until the end of August 1944. In this position he contributed materially to the investigational program in the early operations of the 20th Air Force that gave us the first picture of Japanese radar defenses of the home islands. Later, in February 1945 he went to ABL as Associate Technical Director to relieve Cahill, and continued with that position until the end of the war in the European theatre, returning in July 1945. Upon returning from overseas the final time, Dr. Pettit became Assistant Executive Engineer of the Radio Research Laboratory. Previously at RRL he had been head of a receiver group concerned with the development of the APR-1 and APR-4 receivers, and various pieces of test equipment that went into production.

Sinclair: Worked part time at the Radio Research Laboratory during 1942 and 1943. Dr. Sinclair's contribution to the countermeasures program were important and were two in number. First he organized and trained the original search receiver group at the Radio Research Laboratory, and personally directed the development of the improved tuning units for the SCR-587 receiver, which became the basis for the later APR-1 and APR-4 receivers. In the second place, Sinclair went to the Mediterranean theatre as technical observer on the first Ferret aircraft to see operational use in this war. He was in the Mediterranean from April 1943 until the end of July 1943 and established an investigational program on such a sound basis that the methods he helped establish there were used in all theatres without substantial change till the end of the war. One of the important results of this mission was the great influence that Sinclair's analysis of the countermeasure investigational problem had on all subsequent apparatus development activities at the Radio Research Laboratory. In particular it was at Sinclair's initiative that the direction finder program became such an essential feature of investigational work. While in the Mediterranean Sinclair also laid plans for the first use by our air forces of jamming, which was employed in a small way in the Sicilian invasion (and would have been used then on a much larger scale if the logistic problem could have been solved).

July (RRL business)

July 3, 1947

Dr. C. Guy Suits,
Research Laboratory,
General Electric Company,
1 River Road,
Schenectady, New York.

Dear Dr. Suits:

For more than a year, the War Department has been compiling a list of OSRD personnel to be recognized by some award for their war-time services. The list was finally approved. Dr. Bush in April asked me to prepare the individual write-ups, required by the White House Medal for Merit Board (which also controls the President's Certificate of Merit). After a period of collecting data, I am now writing the statements. Fifty were sent in July 1 and about that many a week will follow.

Division 15 sent in a large number of recommendations, but without information of the services rendered, on which the Board must act. In some of these cases, OSRD files show nothing because the men were contractors' employees, not holding OSRD appointments. Without an adequate statement of what the individual did, between what dates (to the nearest month), something to justify an award, and his present (preferably business) address, the Secretary of War's recommendation to the Medal for Merit Board cannot be prepared; and in that case the award would not be made.

I have no recourse but to ask you to furnish the information. I should have it by August 4. Because they may know some of the

persons, whom you may not know as well, I am sending a copy of this letter to Dr. Terman and to Mr. Moore, as a possible convenience to you and to save time.

I have made the questions as few as will furnish the information I still need. Will you regard the question: "What did he do?" as meaning not only in what parts of the countermeasures field he worked, but also what he accomplished which justifies an award.

Sincerely yours,

W. S. Bowen,
Col., U. S. Army, Ret'd.

Prof. Frederick E. Terman
Department of Electrical Engineering,
Leland Stanford University,
Stanford University, California

Alford: Business address?

Denning: What did he do? (besides Pacific trip)

Black: What did he do? How at Boonton, New Jersey?

Byrne: Until what date (month) was he at RRL?
What did he do?

Cahill: Until what date(month) was he at RRL?
At ABL - 15? Is he still at AIL? If not,
what is his business address? What did he do?

Chase: Was he at RRL? What date did he go to
ABL - 15? What month did he become "Dyer's
associate in charge of administration"?
What month did he leave ABL - 15? What
did he do?

Cullum: Until what date was he at RRL? What did he do

Dyer: What month did Fraenckel go to Spaatz's staff
and Dyer become head of ABL - 15? What month
did he come home? Was he at RRL? What did
he do?

Fubini: Is he still at AIL? if not, what is his
business address? In 1942 he was to be
naturalized. Is he now a U. S. citizen?

Hulstede: Until what date (month) was he at RRL?

Litton: What was the general nature of the "ZP-612
job" which he did? What is his educational
background, degrees, etc.? How long has
he been with Litton Eng. Labs.?

Pettit: Until what date was he at RRL? at ABL - 15?
What did he do?

Schelleng: Between what dates (months) did he
work for Div. 15? What did he do?

Sinclair: What did he do?

Skifter: What did he do at AIL? Between what dates was he there? (Apparently he joined AIL about April 1942).

Towner: Until what date was he at AIL? What did he do (after Div. 15 took over)?

HARVARD UNIVERSITY

Document Office for Government
Research Contracts

G-16 Littauer Center
Cambridge 38, Massachusetts

October 12, 1947

OCT 15 1947

Dr. F. E. Terman, Dean
School of Engineering
Stanford University, Cal.

Dear Dr. Terman:

When the Radio Research Laboratory Document Room closed down, we had in our files a copy of NDRC Div. 15 report, 966-15, copy No. 4, which had been given to the document collection by you, but with a note saying that you would like to have that copy sent to you, when the report became unclassified. It has been unclassified and if you still want to have this copy, I shall be very glad to send it to you. It is entitled, The Input Impedance of Hollow Cylindrical Dipoles, by W. C. Babcock, and is dated August 25, 1943.

This document office was set up under the Office of War Archives, but under the custody of the Office of Naval Research, to handle all of the documents collected in the course of the work under the several OSRD contracts with Harvard. We maintain the RRL document collection as a complete unit, and have another collection, which includes the documents from Cruft, from Underwater Sound, from Electro and Psycho-Acoustic Laboratories, and new documents of current interest. Clearance for the use of this room, and its several collections, is obtained from the Office of Naval Research. Of course, many hundred of the NDRC reports have been unclassified and can be read without special permission, but security regulations are strictly observed on the classified material. Many former RRL men have been here, or have written for information from us, during the year and a half we have been set up for their use, and it is interesting to hear from them.

Trusting that you may remember me, when you recall the document room staff, and that I may be able to help you in regard to the use of information in our documents, I remain,

Very truly yours,

Marjorie L. Cox

Mrs. Marjorie L. Cox, Librarian

October 17, 1947

Mrs. Marjorie L. Cox, Librarian
Document Office for
  Government Research Contracts
G-16 Littauer Center
Harvard University
Cambridge 38, Massachusetts

Dear Mrs. Cox:

I appreciate your letter of October 12 calling my attention to the fact that my copy of NDRC Division 15 report, 966-15, copy No. 4, has been unclassified. I would like to have you send this to me.

I was glad to receive your letter and have the situation with respect to Harvard OSRD documents clarified. I had not realized how things were handled until a few days ago I saw a letter you had written Fred Kamphoefner.

In the past six months I have referred several people, notably men from Gilfillan Brothers and the Rand Project of Douglas Aircraft Company, to the RRL Document Collection at Harvard, and I assume that, although I didn't have the setup exactly correct, they will get steered into the correct channel. I believe the Gilfillan people may have been in Cambridge investigating the situation during the latter part of the summer.

I hope one of these times when I get to Cambridge to drop in for a few minutes and stir up some old memories.

Yours very truly,

F. E. Terman
Dean

FET:bl

Permanent Transfer of document given to RRL Doc. Room for safekeeping

№ 309

TO: Dr. F. E. Terman, Dean, School of Engineering, Stanford University, Calif.

SUBJECT: Receipt of ~~Classified~~ Material

FROM: War Archives Office
Littauer Center G–15
Harvard University
Cambridge 38, Massachusetts

DESCRIPTION	FILE NO.	DATE MAILED
NDRC(15) 966-15, copy 4 (Unclassified report)		

I have personally received the material described above and accept full responsibility for its safe handling, storage and transmittal elsewhere in accordance with existing regulations of OSRD, the War Department or the Navy Department, whichever is pertinent.

Please sign and return original.
Duplicate may be retained by you.

F E Terman
Signature

OCT 31 1947
Date Received

ADDRESSEE'S COPY

February 9, 1946

file - RRL

FILES FROM DIRECTOR'S OFFICE

F. E. TERMAN FILE

411-XIX-13-1

Drawer A.

A - general folder
ABL (See Drawer B - Field Stations)
Airport - Airplane
A/J
Alford
Antenna
Archive Material
Army

B - general folder
Bell Labs.
Black, K. C.
Breed, N. P.
Britain - British
Budget Info.
Business Reports (RRL)
Byrne

C - general folder
Cahill
Catalogues
Caufield
Chinn
CBS general
Communications Jamming
Consultant - Advisor Projects
Cullum

D - general folder
Deliveries & Production Schedule
Design Notes
Diary (of F. E. T.'s trip to England)
Document Room
Doersam
Draft
Drafting Load
Drafting & Machine Shop Time
Dyer

E - general folder
Editorial Committee
Elliott
Emergency Rating Reports
Enemy Radar
Engineering Notes
England, F. E. T's trip to
External Distribution Lists

Drawer B.

F - general folder
Farley
Field Applications Committee
Field Stations (Incl. ABL & Florosa)
Field Testing
Film Committee
Flight Test Priority Lists
Fubini

Drawer C.

G - general folder
Goldmark

H - General folder
Harrison
Harvard
Hickman
Hotchkiss

I - general folder
Informal Liaison Conferences
Invention Disclosures

J - general folder
Jamming
Joint Committee on New Weapons

K - general folder

L - general folder
Leet

M - general folder
Memos to Secretaries
Memos issued from Director's Office
Microwave Committee
Minutes of Staff Meetings

N - general folder
Navy
Newsletters
Newspaper Clippings
Noise

O - general folder
Oliphant
Operational Information
Organization (of RRL)

FILES FROM DIRECTOR'S OFFICE (Cont'd)

411-XIX-13-1

Drawer D.
OSRD (Incl. Div. 5, 13, 14 & 15; OSRD & NDRC Washington Office & London Office)

P - general folder
Personnel
Power Necessary to Jam a Radar (Terman & White)
Procurement
Product Engineering
Production Supervisor
Projects (Incl. RRL Project Committee)
Propagation Committee
Publicity & Final Reports
Publishing

411-XIX-13-2

Drawer A.
R - general folder
Raymond
RCM letters (from Navy)
Reedy
Reference Letters (by F. E. Terman)
Registered Document Receipts
Requisition - Transmittal Memos.
Research Board for National Security

S - general folder
Safety
Salary Policy
Salisbury
"Scope"
Security
Seminar Attendance
Serrell
Shop
Sinclair
Subcontractors

Drawer B.

T - general folder
Talks - by F. E. Terman
Technical Notes
Technical Observers
Technical Program
Termination
Training Program
Transition
Transmitter Charts
Travel
Tubes

Drawer C.
U - general folder
Urgency Ratings

V - general folder
Vacuum Tube Development Comm.
Villard
Visitors

W - general folder
Whipple

X - Y - Z - general folder

Drawer D.
Receipts pertaining to Classified Materi

J. F. BYRNE'S FILE
411-XIX-13-2
Drawer B.
Exec. Engineer's Office - Receipts
Exec. Eng. Transition-Memorandum
Report

A. E. CULLUM'S FILE
411-XIX-13-2
Drawer B.
ASG Correspondence & Reports
Shipping of RCM Equipment to ETO

F. E. TERMAN'S FILE
411-XIX-13-3
Drawer C.
AAF Operations Analysis Reports
Propagation Comm. Minutes
RRL Group Progress Reports
RCM Committee (Incl. JCB, JX/CM and CX/CM)

Stanford University Archives
SC 160 SERIES I
Box 3 Folder: 13

Post-War Files: R.R.L.
1953 – 1970

Melba Phillips

Brooklyn college discharged her
in 1952 because of 5th
Amendment

Richard Wadleigh
A 52 M 39
Mgr Electronic app Div
Sperry Corp
Elmsford (RD), NY

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Was the man part
Indian who claimed
MIT degree

JOHN F. SHELLEY
5TH DIST., CALIFORNIA

Congress of the United States
House of Representatives
Washington, D. C.

ry 5, 1953

Richard Mahler

A 32 M 58

Mgr Electronics app Pur

Sonotone Corp

Elmsford (LI), N.Y.

Was the man part Indian who claimed MIT degree

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Sincerely and cordially,

John F. Shelley

M. C.

d

JOHN F. SHELLEY
5TH DIST., CALIFORNIA

Congress of the United States
House of Representatives
Washington, D. C.

January 5, 1953

Dr. Frederick Terman, Dean
College of Engineering
Stanford University
Stanford, California

Dear Dr. Terman:

The enclosed file is sent to you with the hope that you can be helpful in answering certain unresolved questions to which it pertains. It concerns establishing the original source of the idea of using strips of metal foil dropped from airplanes as "chaff" or "window" in jamming enemy radar. I believe that Mr. Sam Brown of the Defense Department Research and Development had previously communicated with you on the matter at my request.

I have been looking into this matter since June of 1952 on behalf of Traders Supplies Limited of Auckland, N.Z., at the request of a San Francisco attorney who is also a personal friend of mine. Traders Supplies Ltd. controls the so called Halvey patent for using an aerial bomb to drop such foil. They applied for a New Zealand patent on the idea in June, 1942, but as the accompanying file shows they claim "that the idea was first muted in 1941." The Judge Advocate General of the United States Army has denied their claim for any reimbursement on grounds that the Halvey patent was not infringed. Since my letter of September 19, 1952, a copy of which is enclosed, I have again been asked to determine whether or not the idea for the use of "window" by the United States aerial forces sprang from the research leading to the Halvey patent, even though we may not have used the aerial bomb, as such. I understand that you are personally familiar with this matter both from your work with the Radio Research Laboratory and your own research.

Will you kindly inform me from your recollection and your files how and when the idea originally reached the United States, and whether its use by us can, in any way, be attributed to the New Zealand group's patents or discoveries? Please return the accompanying file with your reply.

Sincerely and cordially,

John F. Shelley

d

M. C.

January 12, 1953

The Honorable John F. Shelley
House Office Building
Washington, D. C.

Dear Mr. Shelley:

I have looked over the attached file on the use of strips of aluminum foil with considerable interest, since I was heavily involved with this business during the war.

On the basis of the information in this file, and what one would imply from it, I do not see that the man has any case whatsoever. Some of the background history is as follows:

I first heard of the aluminum foil idea in February or March, 1942. Commander Malcolm Hanson of the Bureau of Aeronautics had been over in England early in 1942 and while there was asked to obtain all of the countermeasures information the British were willing to release. They disclosed to him their work on aluminum foil reflectors and upon his return to the United States he visited my laboratory (Radio Research Laboratory) at Harvard and passed on this information. I believe that Hanson brought the first knowledge of this subject to the United States from the outside. I visited England for six weeks in April and May, 1942 and spent several days discussing the aluminum foil reflectors with the British and studying the reports of numerous tests that they had already run on them by that time.

The Laboratory at Harvard did preliminary work of aluminum foil reflectors in the spring of 1942. This led to a report that our Laboratory published in the latter part of 1942 on the theory of such reflectors. Afterward in early 1943 we did experimental work, and in the summer of 1943 went into pilot production on the American version known as "chaff," which was developed in our organization. At the end of the war, members of our Laboratory interrogated German scientists. It was found that the Germans had done some theoretical work on the aluminum foil reflectors in the summer of 1940. We also found definite records of experimental work done in January 1943.

It is relatively certain that the American activity and knowledge antedate any patent rights that might be enforced by the Halvey patent in this country. Certainly, the British work antedates any dates referred to in the correspondence, and also the first American work is much earlier than the first Halvey filing date. There is, moreover, no generic connection between what was done in this country and the work of Halvey. Finally, if one reads between the lines, it appears that the claims of the patent issued to Halvey are too narrow in scope to apply to the American and British use of aluminum reflectors, even

if Halvey had had a sufficiently early date (which is apparently not the case). Since it is a basic point of patent law that an invention is no broader than the claims that are allowed, it seems to be implied that the legal patent is on something different than was used in the war.

Yours very truly,

F. E. Terman
Dean

FET:vh

HARVARD UNIVERSITY

DEPARTMENT OF PHYSICS

LYMAN LABORATORY OF PHYSICS
CAMBRIDGE 38, MASSACHUSETTS

May 13, 1953

MAY 15 1953

AIR MAIL

Dr. F. E. Terman
Dean, School of Engineering
Stanford University
California

Dear Fred:

You may recall that at the end of the war the RRL document collection, together with those from the Underwater Sound Laboratory, the Psycho-Acoustic group, and Chaffee's communications group, were all put together and housed in one of the Harvard buildings. The maintenance of this document collection has been financed through a contract with ONR. Mrs. Cox of the RRL Document Room has been continuously in charge. ONR has recently given notice that they will not renew this contract after July 1 of this year.

The original understanding which we had with OSRD was that they would permit the Navy to have custody of the RRL documents until such time as a national science foundation or other more appropriate civilian agency might be in a position to take them over. Their idea was, I believe, that they felt the RRL collection was the most complete one then available in the field, and they did not want to see it buried somewhere in an archive of one of the services. Mr. Pratt's office expects to approach the National Science Foundation to see whether they have any interest in this matter. At the same time, knowing your continued interest in the RRL field, I would like your opinion concerning the value of maintaining the collection of RRL documents intact. I suspect it is now so out of date that your answer will be "junk it." If you don't think it worth-while to keep the RRL collection together, we are tentatively planning to transfer all the unclassified material from the various document collections to a Document Room in Pierce Hall, to be under the continued direction of Mrs. Cox.

Since we have to make plans rather speedily, I hope very much that you can give me your opinion soon.

Best wishes.

Sincerely yours,

Roger W. Hickman

P.S. Disposition of classified documents is not yet settled regardless of the decision concerning the RRL collection.

May 19, 1953

Dr. Roger W. Hickman
Department of Physics
Harvard University
Cambridge 38, Massachusetts

Dear Roger:

Most of the material in the RRL document collection is sufficiently obsolete so that it is of only historical interest. Since I doubt very much that any future historian will be interested in wading through the great mass of material, I do not consider that the preservation of the complete collection for historical reasons is particularly important. I realize, however, that this may be biased by the fact that I tend to live in the present and the future rather than the past.

You can however expect that occasionally people will want to refer to some of the formal reports of RRL. I base this on the fact that there has been intermittent use by non-Stanford groups who have had post war contracts in the field, of the RRL reports I arranged to have sent to Stanford.

I would therefore recommend that the series of formal RRL reports in the various numbered series be kept intact at Harvard. This could be on storage basis involving accessibility that was inconvenient but possible.

All of the material that I have in mind could probably be stored in the equivalent of two five-drawer filing cases. Thus the storage problem is not a severe one. However the peripheral material such as TMR's, and most of the internal papers, could be disposed of, as well as all of the reports that RRL received from the outside.

I would advise against breaking up the basic RRL collection into classified and unclassified components, however, since this would make it necessary for anyone who wished to dig out some information to search in two places instead of one. I would feel that most of the unclassified material that is likely to be useful has already been made available to the public in some form. The material that is most likely to be of value to the people still working in the field probably still retains some degree of classification.

Yours very truly,

F. E. Terman, Dean

FET/tl

RRL

RRL.

Nobel prize — Bloch.

Pres am Phys. Soc — Van Vleck.

National academy — Terman.
Kuiper
Bloch
Whipple

IRE honors
Medal of Honor — Terman
West Coast Prize — Pettit
Thompson — Huggins
Welch

IRE Director
Terman — Spangenberg
Cullum — Reich
Dyer — Byrne
Pettit

IRE president — Sinclair

IRE Fellows
Byrne — Harris
Chaffee — Kraus
Cullum — Pettit
Dow — Reich
Dyer — Salisbury
Elliott — (Similar 43)
7 Fuller — 14 Spangenberg

C
O
P
Y

Perrycroft Cottage
Jubilee Drive
Malvern, Worcester

4th March 1962

My dear John:

How very nice to hear from you! When my wife and I were in the States in 1954 we tried very hard to find you but by the time we succeeded in tracking you, it was too late.

Martin Ryle hasn't got it quite right, since the book is not concerned with T.R.E.--at least only in part.

Some months ago it dawned on me that no one had attempted to analyse the origins of ideas that, in the field of science as a whole, contributed to the outcome of the war. That such a book should be written has met with a far greater appeal than I had anticipated and two publishers want the book. It will not be a personal story or concerned primarily with who thought of what. Rather is it intended to analyse the "soil" from which ideas came and to trace the factors which aided or hindered the history of a device from birth to use by one of the Services.

The first step was to get a list of the ideas which top service users think were important. In preparing such a list I have had the greatest help from people like Mountbatten, Slim, Slessor, etc. In fact only 'Monty' has refused to help, no doubt thinking that he did it all himself!

As a result, I have a list of 53 items which these top users think were important to them. I will send you a copy if you like. The publishers are anxious for me to include the American part of the story and indeed it would be impossible to omit it.

What I want to do is to get a list of the American books which I ought to search for what I am after. Would it be a lot of bother for you to think over what you must have read about science and the last war and let me have a list? I am concerned with all three media--land, sea and air. I am not, of course, limiting myself to radar, although the British top users have included about 12 radar items in the 53.

One more matter. Can you think of any American top users who would tell me what most mattered to them? Is your late President approachable?

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Y

I have let myself in for two years research, but I think it will be worth while.

You will be amused to know that, in "retirement", I am doing some part-time teaching of my hobby, astronomy, at Malvern College, the gates of which still stand in spite of trans-Atlantic efforts to demolish the College Rd. ones.

With every good wish. If you come this way, we must see you.

Yours ever,

(signed) A. P. Rowe

C
O
P
Y

Perrycroft Cottage
Jubilee Drive
Malvern, Worcs.

9th April 1962

My dear John:

I am most grateful to you for your letter of 30th March. Two things limit the amount of stuff I feel I ought to send to you. One is the fear that I may be giving you trouble and the other is that I have, in retirement, no secretary and have to do my own typing, etc. These two factors are not independent variables since, within reason, there is no limit to the effort I would put into writing to America on these matters if the interest is forthcoming at your end. My publishers have asked me whether I can include the American story but until now this has seemed out of the question and of course it may still be.

Let us see what is involved. I enclose a list of the scientific items which are considered most to have influenced the outcome of the war. I want to stress that I have not contributed a single item and indeed I know nothing about some of them. They have been chosen by some of the top fighting men of the last war.

Question 1. What additions or deletions would you, or your top soldiers and sailors or your defense scientists like to suggest?
What I am doing at this end is to chase the history of the items on the attached list.

Question 2. Can you tell me which of these items were wholly or in considerable measure the result of American effort?
I am concerned with the birth of an idea and its progress to first use and not with production. For example, I imagine that Sonar buoys was a wholly American idea and your country did the lion's share of the work on the proximity fuse. What others are there? Many, I expect but I just don't know.

Question 3. Can you get for me the names of people at your end who were intimately concerned and lived with the items on the list which you feel are in large or considerable measure American and with any items you or your friends feel should be on the list and which were American in consider-able measure.

oooo

I expect that you will want to discuss all this with those interested and certainly there is no hurry. I have let myself in for two years of research which , of course, will soon pass. To put things as bluntly as I used to do in T.R.E. days, the first thing for you to decide is whether the interest at your end is such that I can put time and effort into seeing that the American part of the story is fairly and fully dealt with. As you know, I am not greatly concerned with who thought of what. I know about and have read the excellent "Scientists against time" but I am seeking first causes and an analysis of why and how things started and were accelerated or retarded by human and other factors. There is, alas, no chance of my coming to the States to discuss these things because I am out of official life and have to pay for my own journeys!

Of course I very much hope that interest will be roused at your end, as it is here, but do not hesitate, if this is not so, to put this letter in the W.P.B. and tell me that you have done so.

Yours ever,

/s/ A.P.Rowe

Key Reference to Subjects chosen as the most important scientific contributions to the late war (Pre-atomic Era)

Sea War

A Magnetic mine counters-deguassing, depermin g
B Hedgehog and ahead throwing weapons
C Sonar Buoys
D Counter to acoustic and other influence mines (sweeping techniques)
E Acoustic decoys
F Oerlikon gun (inclusion doubtful)

Land War

H Communications for fast moving vehicles i.e. mechanised forces
J Proximity fuses
K Medical, particularly tropical diseases
L Flail tank
M Bailey bridge

Air War

P Planned maintenance of aircraft
Q Fido and fog clearance
R Aide. to accurate bombing (general)

Combined Operations

U Pluto
V Artificial harbours
W Landing craft general
W1. L.S.T.
W2. L.S.D.
W3. .. DUKS
W4. Pontoon causeways and Rhine Ferries
W5. Rocket ships
W6. ... L.C.T.
X Radio Decoy (D-Day)

General

AA A.A. Computers and Predictors Tachymetric soln, of Fire Control
AB Rockets
AC Jet Propulsion (doubtful because of limited use)
AD German VI and V" (will not be treated in same way but serve as examples that ideas not all on one side)

....

Radar

RA Radar for A.A. gunnery
RB CH..The main chain
RC CHL against lowflying a/c
RD A.S.V. and Leigh Light
RE A.I.
RF Gee and possibly H
RG I.F.F.
RH H2S
RJ Oboe
RK P.P.I. and G.C.I.
RL Microwave transmitters and receivers
RM Surface warning-radar in ships
RN Radar in bombardment

Radio

RO Radio HF/DF
RP Radio Cpuntermeasures (Windo etc.)
RQ Exploitation of VH/F and UH/F
RS D/F. particularly H/F D/F ashore in anti-sub warfare
RT Radio analysis (suggested by 1st Sea Lord but more exact definition needed)

Operational Research

OA Depth charges, use of
OB Anti-submarine campaign
OC Effects of bombing
OD Effects of bombardment
OE Analysis of convoy sizes and effect on losses

Examples: of useless expenditure of money and effort on large scale.

UA Habbakuk
UB Bombardon
UC U.P. (Cherwell's bits of wire, etc.)

/s/ A.P.Rowe
April 9, 1962

RECEIVED
MAY 22 1962
PROVOST'S OFFICE

CUTLER-HAMMER

CONTROL AIL DIVISION

AIRBORNE INSTRUMENTS LABORATORY
DEER PARK, LONG ISLAND, NEW YORK
PHONE: 516 MY 2-6100

MEMORANDUM

May 17, 1962

TO: Messrs. R. W. Larson
F. D. Lewis
G. F. Metcalf
L. R. Philpott
J. J. Slattery
C. G. Suits
F. E. Terman
J. G. Trump

FROM: J. N Dyer

SUBJECT: A. P. Rowe

At the Division 15 meeting several people said they would like to see the list of questions which A. P. Rowe mentioned in the letter which I read to you. I wrote to Rowe about this and received the attached reply.

I do not want to mislead A.P. about this matter because I suspect that although many of us would be willing to give a small amount of help in his project no one would be able to accept the major responsibility to handle the American end of the story he is trying to write. I intend to tell him on my own behalf that I can give him a small amount of assistance but I do not have the time to do very much more.

Regards,
ORIGINAL COPY SIGNED BY
J. N. DYER

John N. Dyer

JND:dm
Attach.

June 11, 1962

Dr. A. P. Rowe
Perry Croft Cottage
Jubilee Drive
Malvern, Worcester, England

Dear Dr. Rowe:

John Dyer told me last March about your project, and subsequently he sent me a copy of your letter of March 9 to him.

Of the various items that you mention, there is one where I could spell out the way in which certain ideas developed. This relates to window (or chaff).

As you know, I was the organizer and director of the Radio Research Laboratory (RRL) at Harvard University, which was concerned with countermeasures against radar. This laboratory was organized shortly after Pearl Harbor, and in April 1942 I went to England to get the benefit of the British experience and thinking in the field. I had been told about the British window shortly before I went to England, and I spent quite a bit of time talking about window and reading the reports of British tests during the six weeks that I was overseas. At that time the preferred form of window consisted of flat sheets, typically letter paper size, usually with tissue paper backing one side of the tinfoil. In some cases propaganda was printed on the tissue paper. The British had done a little experimenting with wide strips, perhaps an inch to two and a half inches in width, but the investigation of resonant dipole was not being actively pursued at the time.

In the United States we were very much interested in window as soon as we heard about it, and we started to do some work of our own on the subject as quickly as possible. In particular, Win Salisbury gave the matter attention in the spring and summer of 1942. He developed the idea that dipoles with a geometrical configuration giving a broad resonance curve would be preferable to non-resonant reflecting sheets. His reasoning was that the German Wurzburg radars were concentrated in a relatively limited band of frequencies, so that a broadly resonant dipole would be effective against the entire system. In order to achieve broad resonance he proposed to roll the tinfoil up into cigarette shaped cylinders, so that the ratio of dipole diameter to dipole length would be much greater than customary in wire antennas. This was an old idea for broadbanding an antenna.

Salisbury thereupon rolled up a lot of such dipoles by hand; these were of length suitable for certain American radar frequencies then in use. Field tests were about ready to start when we had security restrictions placed on us that prevented us from doing any testing at all, even when the material was dropped at sea under conditions where it could not possibly reach land. The concern was that radar operators against whom the test were made would learn of the idea of window, and there might possibly be a leak to the German as a consequence.

This caused our window program to go dormant for a period. However, I did not want to see it die, and so after a couple of months made arrangements with the MIT Radiation Laboratory to borrow the services of Dr. L. J. Chu who was the best antenna theorist in the United States at that time (and perhaps still is) to make theoretical studies of scattering cross section. To my knowledge this is the first theoretical study of window - the British work that I had seen was all experimental. Chu investigated the scattering cross section as a function of frequency for rectangular sheets with random orientations, making calculations for varying ratios of width to height. Also, because Salisbury had been thinking in terms of other shapes, Chu likewise developed formulas for the scattering cross sections of cylinders, ellipsoids with high degrees of eccentricity, and various other geometrical shapes. Chu completed his work in a few months, and wrote a report giving formulas, sample results, and curves.

The Chu report was filed in a safe because that was all we could do with it, but it was not forgotten. After the passage of some additional months, I concluded that although window was still super top secret, the war was developing and that one of these days someone was going to start using it. When this happened, the United States needed to be ready to participate. Accordingly, I gave the astronomer, Fred Whipple, one of RRL's new recruits, the job of looking over Chu's report with particular reference to practical applications. After studying Chu's results, Whipple came up with an observation of great practical significance. This was that it was implicit in Chu's mathematics that the scattering cross section over a wide band of frequencies that could be obtained from a pound of aluminum foil would be greatest if the foil was in the form of resonant dipoles; and that Chu's theoretical formulas could be arranged to demonstrate the unexpected conclusion that even far off resonance the narrower the dipole the greater the scattering cross section would be for one pound of foil.

This remarkable result can be explained crudely by the following line of reasoning. The scattering cross section <u>at resonance</u> of a dipole is not affected significantly by the physical width of the dipole, i.e. by the sharpness of resonance of the dipole as a resonator. At the same time, the narrower the physical width (or thickness) of the dipole, the more rapidly the response drops off when one departs from the resonant frequency. However, if one makes the dipoles physically narrower, the falling off in scattering cross section <u>per dipole</u> when far off resonance drops off something like the logarithm of the reciprocal of the physical width (i.e. off resonance response <u>per dipole</u> is inversely proportional to the number of dipoles per pound) whereas the number of dipoles per pound is inversely proportional to

the physical width. Now since the ratio of a number divided by its logarithm always gets larger as the number becomes bigger, i.e. as the number of dipoles per pound is increased by making them thinner and thinner, the actual scattering cross section far off resonance is increased by making the dipoles thinner. That is, the increase in the number of dipoles obtained by making them thin, beats out the decrease of off resonance per dipole that is caused by the thinness. At the same time, in the vicinity of resonance the response is enormously enhanced by using resonance dipoles, in proportion to the number of dipoles (i.e. the thinness). Whipple thus concluded that the direction in which to work was to make the dipoles as narrow as possible. Thus was chaff born.

The next obvious thing was to stagger the resonant frequencies of the dipoles contained in a single packet so that the benefits of resonant enhancement of the echo were spread out over the band. In the end, the chaff used by the American B-17 planes against the German Wurzburg radars contained dipoles cut for three different resonant frequencies in the Wurzburg range.

This was all very well as an intellectual concept, but the problem still remained as to how to manufacture very narrow dipoles of aluminum foil that were less than one mil thick, and still have dipoles that were stiff and straight and did not curl up. This situation was presented to a very ingenious, inventive, mechanical engineer-designer in our laboratory named Harold Elliott. Elliott solved the problem by working out a means of producing in quantity dipoles which were very narrow strips of aluminum foil bent in the form of a V beam, with the angle of the V being about ninety degrees. He did this by the use of a milling cutter operating in conjunction with a knife edge, with the alternate teeth of the cutter dulled just a little bit. The foil in the form of a sheet (from a roll) of width equal to the desired dipole length was fed into the cutters by rubber rolls and geared to the cutter drive in the proper ratio so that the advance of the foil during the passage of two teeth equalled the desired dipole width. Referring to the attached crude sketches, one cutter would nip off the foil, while the next cutter would knock the foil down through a ninety degree bend, but would fail to cut it off because the cutter was dull. The next cutter would then trim off the foil to produce a V. Each cutter had some twenty or more teeth, and operated at a good many revolutions per second, so that the rate of dipole per production per minute was quite impressive.

It took some two thousand dipoles to produce a reflection equal to a four engine bomber, but enough dipoles for several such packets could be produced per minute by the initial chaff machines that were built. Ultimately the production rates were increased so that a package equal to one four engine bomber could be produced every few seconds.

The conceptual steps leading to the end result of chaff produced in practical quantities can now be summarized. The beginning was the British concept of a non-resonant scatterer. The next step was the proposal to replace the non-resonant reflectors by resonant dipoles.

The physical form of dipole proposed (hollow cylinder) was, however, completely impractical. This was followed by a theoretical study of scattering, which included a wide variety of geometries as a result of the impractical hollow cylinder resonant device that had been suggested. There was then the review of the theoretical results, that uncovered the fact that sharply resonant dipoles would give more reflection per pound than either broadly resonant dipoles or non-resonant reflectors. Finally there was the step of devising a technique to produce the very narrow resonant dipoles in quantities adequate to meet the war needs (some 80,000 pounds or about 1,800,000,000 dipoles were used in each bombing raid of B-17 planes).

This chain of events has always intrigued me. I therefure pass it on to you for whatever value it may have in connection with the very interesting project on which you are working.

Sincerely,

F. E. Terman

cc: J. N. Dyer

July 23, 1962

Mr. A. P. Rowe
Perrycroft Cottage
Jubilee Drive
Malvern
Worcester, England

Dear Mr. Rowe:

I am glad to learn that my story on chaff may be useful to you.

With respect to the dummy invasion on D Day, John Dyer would know to what extent, if any, there was USA participation. I understand that this operation involved dropping a lot of chaff or window from airplanes, plus a number of harbor defense motor launches each carrying a number of jammers, that paraded out in the channel and made a big electronic demonstration. The jammers may have been made in the United States; if so they originated with the Radio Research Laboratory.

You also ask about the intimacy of contact between service people and the research laboratories in the OSRD operation. It is impossible to generalize on this matter because the USA war effort in science was scattered among a number of different groups working on different subjects and located at different places. As a result each laboratory developed its own independent practices and characteristics.

At our OSRD laboratory - the Radio Research Laboratory - we worked very closely with the military people because this laboratory was not established until after Pearl Harbor, i.e. until early 1942, and in order to do anything useful for the war, it was necessary that we tune in very closely with the military thinking and work hand and glove with them. Also the countermeasures work against enemy radar depended vitally upon intelligence information, and for this we were dependent upon the military.

As a consequence of these various factors, the Radio Research Laboratory probably had relations with the armed services that more closely resembled those of the British than did many of the American laboratories. For example, although every American B-17 bomber from late 1944 on carried either chaff or jammers originated at the Radio Research Laboratory, there was to my knowledge never a single bombing plane sent to the European or Mediterranean Theaters that was equipped in the USA to use jammers or chaff. This all had to be retrofit work done at airfields in Europe and Africa between missions, and the technical know how for this was provided by men from our laboratory that we sent overseas. This interdependence naturally insured a high level of intimacy.

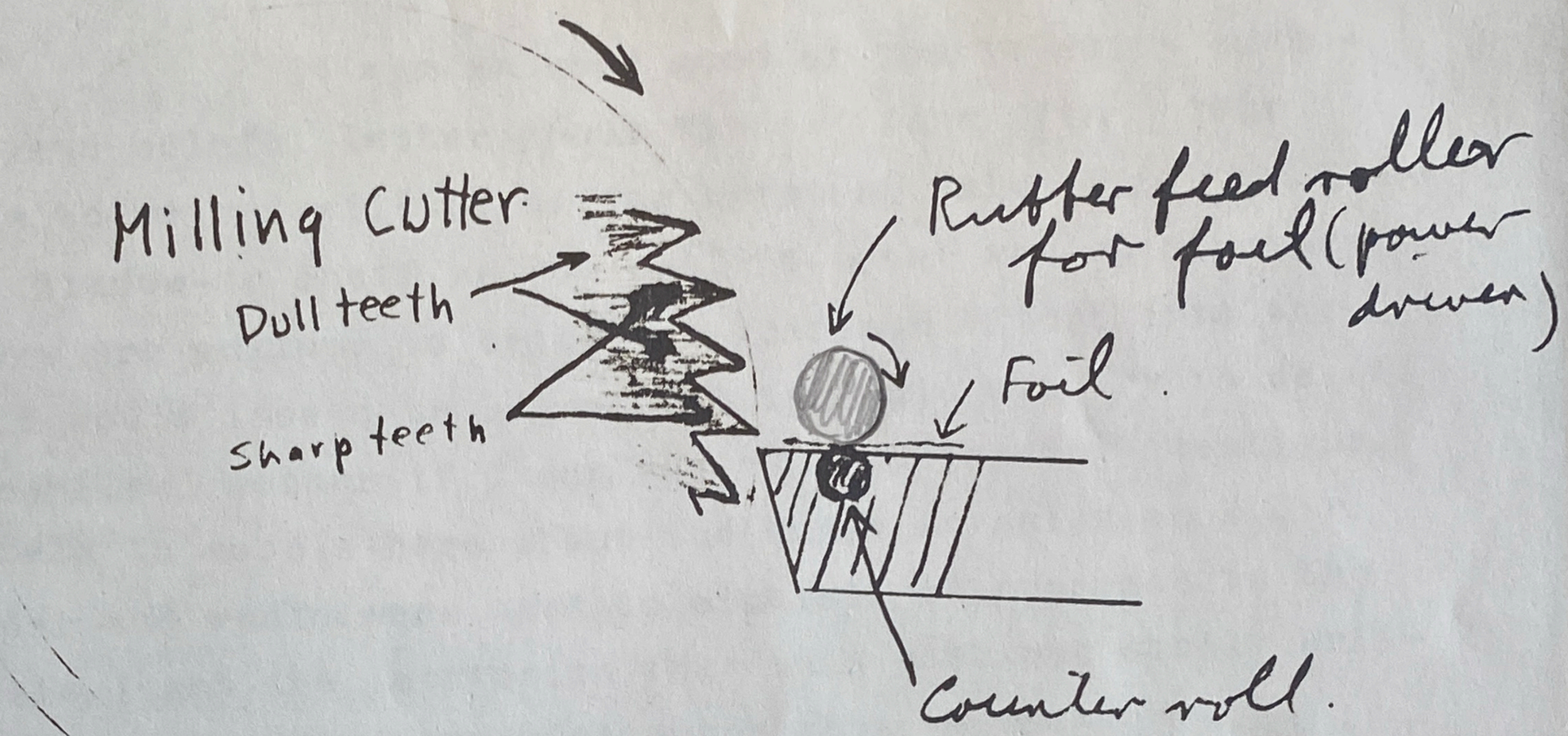
The line of authority of the USRD laboratories differed greatly from that of the British. In particular, our laboratories did not receive funds from the armed services, but rather initially directly from President Roosevelt's executive funds, and later directly from Congress. Also our ultimate boss was Dr. Vannevar Bush of OSRD, who reported directly to President Roosevelt and not to the military. Thus, the association of OSRD laboratories with the military was strictly a voluntary basis from both sides. As an example, the Radio Research Laboratory had complete freedom of action to develop what we thought the war needed, irrespective of whether or not the military at the time thought this was a good idea. On the other hand, unless we developed things that turned out to be really useful, and unless we could convince the military as to this usefulness, our work would be wasted. Similarly, the military people could turn to us to get help, and could do so on a rather informal basis because all they had to do to get our help was to persuade us that what they wanted done was really worth doing. In such a case, we would respond without anything formal being done by them. This naturally placed a great deal of responsibility on the management of RRL as to how we allocated our efforts, and resulted in our being very independent. At the same time, we were able to make important decisions quickly and to act decisively once decisions were made; also we never lost time in getting up to the 25 models of one-of-a-kind stage because of waiting for higher authority to act.

In general, the system worked out pretty well, and as I look back upon those war years, they were exciting and full of intense effort, but extremely rewarding in terms of what was accomplished in relationship to the efforts and hopes that were invested.

If there is anything further on which I can be of help, or if you would like me to elaborate on some of the above points, please let me know.

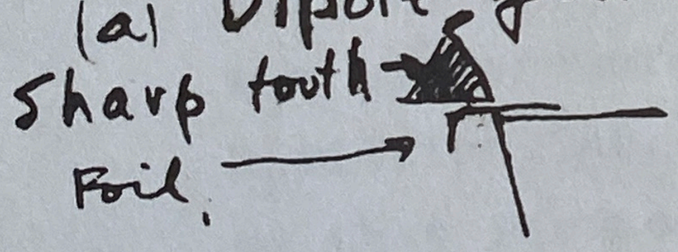
Sincerely,

F. E. Terman

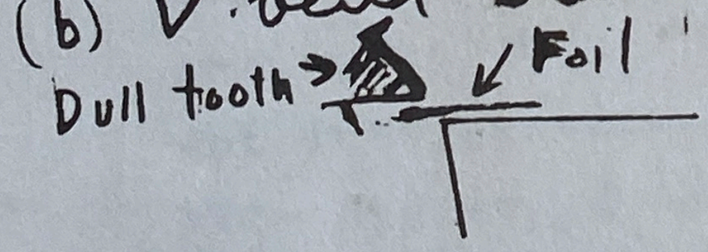


Successive positions

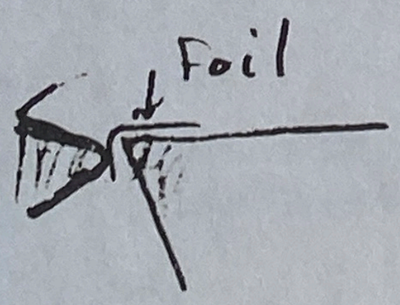
(a) Dipole just being cut off



(b) V bend about to be made.



(c) V bend has just been made.



(d) Same as (a).

Terman

RECEIVED

RECEIVED
JUN 28 1962
PROVOST'S OFFICE

Perrycroft Cottage,
Jubilee Drive,
Malvern,
Worcs
England

24th June 1962

My dear Terman,

It was so very good of you to write such a fascinating and helpful letter about Window (June IIth). Your story is new to me and will be of the greatest value. I may write again about Window-or Chaff as you call it-after seeing Cockburn. My publishers are anxious to bring the American effort into the story and it would indeed be ungrateful if I did not try to do so.

Meanwhile I wonder if I can ask you two leading questions.

(I) If I talk to people here about the dummy invasion on D day, whereby radar and radio were used to simulate an approach to the pas de Calais, I get the impression that this work was wholly British-but was it? I find it somewhat surprising to think so.

(2) To whom in America could I best write to get an answer to a puzzle in my mind. T.R.E. boasted that it had intimate contact with the Service people. Policy was really decided at Sunday Soviets where Commanders in Chief, young men fresh from ops. and scientists said what they liked. Formal contracts etc came afterwards. Now in the history of O.S.R.D. it is emphasised that places like the Radiation Lab. were given contracts and it has been suggested to me that Service people did not live on the doorstep of research labs. in the States as they did with us. I remember Lee du Bridge asking me when I first met him, how what percentage of our projects got into service. He was astonished when I said that nearly all of them did so. I think he said that his percentage was 25%. This was not because we had no silly ideas but rather that they were killed at birth by Service users. How can it come about that the factor which we say was the most important one in producing results could be dispensed with by your successful teams? I would be most glad if you could tell me the answer or tell me to whom I should turn for one.

One again, let me say how indebted I am to you for your help.

Yours sincerely
A. P. Rowe.

H. C. Early, H. W. Welch, D. B. Harris, F. E. Terman, S. S. Attwood,

Terman

RECEIVED
JAN 2 1963
PROVOST'S OFFICE

27 December 1962

Mr. Frank A. Taylor, Director
Museum of History and Technology
Smithsonian Institution
United States National Museum
Washington 25, D. C.

Dear Mr. Taylor:

Some two years ago, as arranged at my request by Professor H. S. Bull of this Department, we shipped you a number of items of equipment that seemed to us to have some historical significance. At that time I had intended to send to you more descriptive material dealing briefly with uses that were made of certain of these items, to some extent here, and to some extent during World War II.

I have finally succeeded in getting this material together, and am enclosing it herewith. I think you may find of particular interest the comments regarding the Resnatron Tube, and the artist's conception enclosed of the appearance of equipment using it installed in 1945 on the shore of the North Sea looking toward the Dutch Coast. I have a somewhat larger copy of this picture on my office wall, and not infrequently find it an interesting conversation piece.

The items with which the attached material deals, being items sent you about two years ago, are as follows:

"The General Electric Co. DuFour Type Cathode-Ray Oscillograph."

"Fifteen-Kilowatt Continuous-Wave Split Anode Ultra-High-Frequency Magnetron Oscillator." (A World War II Research item.)

"An Early Model Westinghouse Ignitron."

"An Experimental Resnatron." (A World War II item, related to the attached framed artist's conception, which is in fact close to the reality.)

I hope these items may to some degree add to the completeness of your information regarding these items.

Yours very truly,

W. G. Dow, Chairman
Electrical Engineering Department

WGD/ap
Enclosure
cc: H. S. Bull

bcc: L. N. Holland, J. R. Black, W. W. Salisbury
H. C. Early, H. W. Welch, D. B. Harris, F. E. Terman, S. S. Attwood,

RECEIVED

An Experimental Resnatron

W. G. Dow

The Resnatron, as experimentally built and incorporated into lend-lease military equipment during World War II, was a large and heavy continuously-pumped high-vacuum tetrode, having the oscillating circuit built integrally with the beam-forming apparatus. It was used for producing continuous-wave ultra-high-frequency power (300 to about 650 megacycles per second) at power levels up to fifty kilowatts and above. The name initially given was the "Sloan-Marshall tube", as the basic inventive concepts were due to Dr. David H. Sloan and Dr. Lawrence Marshall. Both of these men had been associated with the Radiation Laboratory of the University of California at Berkeley, California before World War II, and had there, as a result of their work on the cyclotron, devised this tube's particular method of generating continuous-wave ultra-high-frequency power at high power levels. Prior to the appearance of this tube the highest-power continuous-wave output at these frequencies had been fifty watts.

The actual research and development work on the Resnatron tubes was done by Dr. D. H. Sloan at the Westinghouse Research Laboratories in East Pittsburgh, Pennsylvania, under a contract between Westinghouse and the Office of Scientific Research and Development, administered through Division 15 (Countermeasures) of the National Research and Development Committee. The tubes were manufactured by the Westinghouse Electric Company at its Sharon, Pennsylvania plant. The first models of the Resnatron were incorporated in what was known as the "Tuba" equipment. The Tuba equipment containing these first models was built at the Radio Research Laboratory of Harvard University, Cambridge, Massachusetts, under contract with the U. S. Government via Division 15 of the NDRC and the Office of Scientific Research and Development. The Tuba unit containing these first models was shipped to England in the spring of 1944, and became operational during the early summer. The purpose of the apparatus was to radiate a jamming signal to destroy the effectiveness of the airborne radar carried by the German night-fighter aircraft attempting to intercept bombers of the British Bomber Command in their nightly raids over Germany. The effective range of the jamming signal, from the Tuba installation on the shore of the North Sea at the small town of Sizewell, near Thorpeness, was 200 miles, just above the coast of Holland. This limit was actually set not by the power available but by the combination of the curvature of the earth, the nearly line-of-sight nature of radio transmission at these frequencies, and the altitude of about 20,000 feet at which the bombers flew.

The first models of the resnatron tube had a continuous-wave generating capability of about 15 kilowatts, and a relatively narrow noise-jamming bandwidth of about 2 to 21/2 megacycles. The subsequent models, shipped to England in November, 1944, had a continuous-wave capability well over 50 kilowatts and a significantly wider bandwidth. I was responsible for making at Harvard the first full-power operational tests of the second-model resnatron tubes as delivered by Westinghouse, for the design and proving in of the noise modulation equipment, also for bringing into operational condition in field locations the second-model equipments. These were built at the Delta-Star Corporation's plant in Chicago, to engineering design specifications provided by Mr. Robert Scott at Harvard.

During the test phase, at the Chicago location, power output values up to 85 kilowatts continuous-wave were measured from these second-model tubes, for periods long enough to establish thermal equilibrium in the various parts of the power conversion apparatus. These units were installed at Sizewell on the North Sea under my direction in January, 1945, and turned over to representatives of the British Royal Air Force and The Air Ministry. By this time the war had progressed to a point where the need had passed for the purpose originally intended. It was very significant, however, in relation to the evaluation of the research and development program, that the equipments performed very well indeed, and that the installation time was very short. Perhaps the most important fact about Tuba was its unquestioned demonstration that it is in fact possible to generate continuous-wave power at these frequencies and power levels with reasonable efficiency and good reliability.

There is being sent with this communication a framed artist's conception of how these second-model units appeared after installation at Sizewell. It has been very interesting to me to observe how close to the reality the artist's conception proved to be. In the foreground center are two trucks containing Diesel engines driving a 150-kilowatt alternating-current electrical generator in each truck. To the right of these is a maintenance truck. Just beyond the two power Diesel trucks are shown two rectifier trucks, which converted the power from the generators to direct current at between 12,000 and 15,000 volts. This direct-current power was then transmitted over a short power link to the two oscillator trucks which are shown just beyond the rectifier trucks.

Each oscillator truck had a resnatron tube as its primary working unit, and in addition extensive water cooling and modulating equipment. The actual power output needed for the original jamming service was in the neighborhood of 20 to 30 kilowatts at a maximum, which the tubes delivered rather easily. The efficiency was perhaps 30 per cent, which placed a very severe demand on the water-cooling system in the oscillator trucks.

RECEIVED
FEB 7 1963
PROVOST'S OFFICE

THE READER'S DIGEST

Memorandum from Frances V. Rummell

February 5, 1963

Dr. Frederick E. Terman

Dear Fred,

At long last I have received a reprint of the Johnny Foster article in which you expressed interest. I enclose it herewith.

Do hope the deluge of fan mail has let up by now. I enjoyed Mr. Wallace's letter and it was nice of you to send it along.

Delighted to hear that the Digest has given you some records!

All good wishes,

Frances

P.S. Please do not bother to acknowledge.

companies, has operated since 1948, giving technical advice to member companies on reclamation problems and cooperating with federal, state, and private agencies on projects in reclamation research and field experimentation. While the association can point to successes in rehabilitating slopes and ponds in stripped areas, few people, even coal partisans, are likely to argue that the industry can't do more.

The 1964 Kentucky law and the projected revised regulations obviously tighten controls on strip-mining methods. Governor Breathitt has stated that further action will be required in the 1966 Legislature. Because, with tightened controls, companies in states with strip-mine laws less demanding than Kentucky's, or with none at all, would enjoy a competitive advantage over Kentucky companies, Breathitt has advocated a federal strip-mining law. He is also working for adoption of interstate compacts containing uniform standards of regulation and reclamation by strip-mining states.

1 OCTOBER 1965

DOD: Johnson Appoints Foster, Chief of Weapons Laboratory, to Head Pentagon Research Unit

President Johnson's penchant for making surprising appointments was displayed again recently with his nomination of John S. Foster, Jr., to be Director of Defense Research and Engineering (DDR & E). Foster, who has been Director of the Lawrence Radiation Laboratory at Livermore, California, since 1961, has a reputation as a creative weapons scientist and talented administrator. In his views on matters affecting politics, however, he has been only slightly less controversial than his more vociferous Livermore colleague Edward Teller. Like Teller, Foster was among the small band of scientists who publicly opposed the test-ban treaty with the Soviet Union in 1963.

Foster, a 43-year-old physicist who looks barely 33, is the son of physicist John Stuart Foster. Foster Jr., whom everyone he has ever met appears to call "Johnny," was born in the U.S. but grew up in Canada and attended McGill University. His undergraduate studies were interrupted by World War II, when he moved to Cambridge, Massachusetts, to work in the Radio Research Laboratory at Harvard on electronic countermeasures to German radar. In 1944–45 he followed up his laboratory work by serving as a civilian adviser to the 15th Air Force in Italy, helping to train crews in the proper use of the countermeasure equipment. Returning to Canada after the war, Foster graduated from McGill with honors in 1948, then moved on to Berkeley for graduate work in physics under E. O. Lawrence.

Foster obtained his Ph.D. (for work on ion properties) in 1952, the year in which the long argument over building the hydrogen bomb came to an end with Truman's decision to go ahead. The debate, and the conviction of many war-scarred scientists at Los Alamos, the government's chief atomic weapons facility, that the H-bomb was not needed, had persuaded many defense and scientific leaders that an additional source of scientific talent and advice in the weapons field was desirable. Lawrence was chosen to set up a new laboratory, and with him to Livermore went a group of young men who have subsequently played key roles in shaping the U.S. defense establishment. In his new post Foster will follow two other Livermore "graduates," Herbert York (now Chancellor of the University of California at San Diego) and Harold Brown, who is moving over from the DDR & E post on 1 October to become Secretary of the Air Force. (Both York and Brown also preceded Foster as directors of Livermore.) Other members of the Livermore staff have served in other Pentagon roles.

Livermore men have generally been noted for an exuberant, enterprising spirit and, particularly in the case of Foster, for a relative freedom from the kinds of moral uncertainties about weapons development that have characterized older generations of atomic scientists. An article about Livermore which appeared in *Fortune* in 1962 quotes Foster as saying: "Force, nuclear force or any other, is not in itself immoral. Morality involves how it is used."

At Livermore, Foster rose through a series of promotions, becoming a division leader in 1955, associate director in 1958, and director in 1961. After beginning his work there on Project Sherwood, one of the laboratory's at-

39

RECEIVED

SC 160 SERIES II
Box 3
Folder: /3
1953-1970

John S. Foster, Jr.

tempts to explore the peaceful uses of atomic energy, Foster switched to weapons. Although the precise nature of his contributions is secret, he has been referred to as a leading designer of smaller nuclear weapons, and is reported to have been influential in pursuing development of the so-called "clean" or neutron bomb. In 1960, as one of the first recipients of the Ernest O. Lawrence memorial award, Foster was cited by President Eisenhower "for unique contributions demanding unusual imagination and technical skill" in the development of atomic weapons. And, at the same time that he was involved in weapons work on the scientific level, Foster was serving as an adviser to all three military services; in this capacity he is said to have been an outspoken advocate of military strategies utilizing some of Livermore's inventions. He has also been a consultant to the President's Science Advisory Committee.

A skeptic about the unpoliced moratorium on nuclear testing that ended with the Russian test series in September 1961, Foster did his best to keep the laboratory in a state of readiness and is generally credited with having held it together during that period. That experience appears to have been partly responsible for his opposition to the test-ban treaty, about which he testified, "we must provide a scientific climate that will not discourage [military] developments . . . From purely technical-military considerations, the proposed treaty appears to me disadvantageous."

So far, the Foster nomination has evoked relatively little response. The Washington *Post* seemed to question the propriety of appointing a test-ban opponent to the third highest civilian job in the Pentagon, stating in the headline of a front-page story, "Pentagon Science Boss Is 'Hawk'" and reporting that, on the basis of his attitude toward the test ban, "Foster is looked upon by many in the scientific community as a hawk. . . ." Members of the security-minded Senate Armed Service committee, however, who voted last week to endorse the appointment after confirmation hearings that lasted less than 15 minutes, went out of their way to commend Foster for his test-ban testimony and seemed immensely pleased by his selection.

How relevant Foster's past views will be to his new position is uncertain. The chief function of the DDR & E is to advise the Secretary of Defense in scientific and technical matters relating to research, development, testing, and evaluation of new weapons systems. In practice, under Foster's predecessor Harold Brown the office became a stronghold of supporters of McNamara's policies and figured heavily in operational decisions such as those to cancel development of the Skybolt missile and the Dyna-Soar air-space plane (*Science*, 23 July).

The office has recently undergone a reorganization which resulted in the elimination of some of its responsibilities in the space field, and before the selection of Foster there was speculation in the trade press that, with Brown as Air Force Secretary and General Bernard Schreiver of the Air Force Systems Command directing the new manned-orbiting-laboratory program, the influence of DDR & E in the Pentagon might be downgraded. With Foster in charge, this development seems less probable. He and Brown are longtime associates (Brown seems to have recommended Foster as his successor), and a Brown-Foster team is more likely to strengthen the office than to weaken it. The new team could also strengthen the position of the "defense intellectuals" (with whom Brown is identified) in dealing with the military services.

What Foster's attitude will be toward the political and foreign policy questions that may come his way is harder to predict. The disarmament front has been quiet for some time—the Johnson administration's evident determination to press the Vietnam war may be one reason why Foster's selection has been greeted with such warmth. But there have been reports recently of the possibility of a new Russian initiative in the disarmament field—perhaps in the form of a proposal to extend the test ban to underground explosions above the level of force at which verification requires direct inspection. If such a proposal is actually forthcoming, the man in Foster's new slot will have a lot to do with evaluating the advisability of accepting it. In Washington, the feeling seems to be that, while Foster has disagreed with McNamara on such issues in the past, the broader responsibilities of his new job will in time lead him to take a more compatible position.

—ELINOR LANGER

Congress: Birth of NSF Recalled as New Foundation Is Established To Strengthen Arts, Humanities

New ventures in federal support of educational and cultural affairs seldom come without struggle and controversy. This rule was illustrated again recently when Congress finally created a National Foundation on the Arts and the Humanities (NFAH), sister agency to the National Science Foundation, which itself had a difficult birth 15 years ago. Proposals for federal assistance to the arts have been before Congress at least since the late 1950's, but not until last year was approval obtained for even an arts advisory council. This year, in the most liberal Congress since the early New Deal, the bill (see box) establishing the new foundation won approval handily, but provoked warnings of "federal control" and "culture czars" that recalled the debates that preceded the creation of NSF.

The measure grew partly from a strong recommendation by the academic community, however, and carried the enthusiastic endorsement of a number of scientists. In the spring of 1964 a Commission on the Humanities, sponsored by the American Council of Learned Societies, the Council of Graduate Schools in the United States, and the United Chapters of Phi Beta Kappa, completed a year's study and issued a report urging that a National Humanities Foundation be established.

"The laudable practice of the federal government of making large sums of money available for scientific research has brought great benefits, but it has also brought about an imbalance in one field of study and dearth in another," the commission said. Creating

RECEIVED
DEC 11 1963
PROVOST'S OFFICE

Route 4, Box 429
Tucson, Arizona
December 9, 1963

Dr. Frederick E. Terman
Stanford University
Palo Alto, California

Dear Dr. Terman:

This letter would probably not have been written under normal circumstances. In fact, I have put off the writing of it, while pursuing every other possibility, until this has become a last and urgent resort.

Between 1942 and 1946, during your term as Director of the Radio Research Laboratory at Harvard University, I worked in the machine shop there until the work in the shop ended and I was transferred to the Illustrating Department, where I remained until the end of the project.

Recently I came across a letter from Milton Hare, written to me in June of 1950 from Union College, Lincoln, Nebraska. He said: "About three weeks ago the first patent came through on the Donutron. Apparently such things move very slowly. - - Two or three times I have received brief notes from Dr. Crawford in connection with patent material." etc. In a later letter he told me: "Did you know that Sylvania is using your die now?" I designed and made the die for the anode used in the Donutron. You may remember that I was assigned to that project at the special request of Milton Hare and Dr. F. H. Crawford because I was the only one who succeeded in fulfilling their specifications for the anode. I doubt if you knew, however, the obstacles under which I made the die.

Milton Hare asked me to consider the possibility of a die for the anode, since I, exclusively, had been making the different anodes for over a year. After a great deal of thought and study on the idea, I woke up in the middle of one night with a design in my head so clear that I got up immediately and drew it with exact measurements. The next morning when I showed my design to Milton Hare, he told me to go ahead and make the die exactly as I had conceived it. I protested, of course, as I had never made a die and had no training as a die maker. He assured me I could do it, as I had done all of the anodes so successfully, also without any special training. To make the die, I needed a reamer with a shoulder on it. When the reamer was ground to my specifications and returned to me, I "miked" it, and was, much to my surprise and shock, cursed in no uncertain terms for "daring" to question the work of a man with thirty years experience. When I apologized and explained that it was to make a die and that I would have "miked" a piece of raw stock, under the same circumstances, the reamer was grabbed up and taken to the Inspection room where it was put under a 200-power magnifying lens. It measured three-thousandths of an inch off my specifications, exactly as I had found with my micrometer. We got another reamer from the tool room and it was ground for me in such anger that the cutting edge was burned. I took it to Mr. Zimmerman, one of the foremen, to get his opinion on its usefulness. He asked me what I wanted it for anyway. When I replied: "To make a die", he exploded:"What do you mean, make a die?! You're no die-maker!". I told him that I knew that only too well, but that I was only trying my best to do the job assigned to me. Whereupon he snapped: "Well, you can't have another reamer. If you can make a die, make your own tool for it." So I got all the material I could on reamers and started making a

reamer. That brought contemptuous remarks from the tool-maker. Even Mr. Wilkins observed, when it was almost finished, that he doubted if it would work, that I was not making it correctly. I asked why he had not advised me sooner and he only said to go ahead and see how it would turn out. Just as I was about finished with the milling of it, Mr Angel, impatient to use the machine, came over and said:"Come on, come on! You've had this machine long enough. Just cut it off here and be done with it!" and he drew his scriber across the end of one of the blades. This was the only time in my life that I came near to hysteria. I asked one of the girls to put my tools away for me, then managed to get as far as the dressing room before I literally went to pieces. The nurse came in and forced a sedative on me (the only time in my life that I have ever had a sedative), and wanted to report the incident immediately. I begged her not to, as I did not want to be the center of a controversy. I simply went home and went to bed, too ill to do anything more.

I lived alone and was not well, anyway. It was that year, 1944, when I had an operation for cancer of the intestines. I had, also, and still have scoliosis from a serious back injury, because of which Mr. Wilkins had kindly put a traction bar behind my work bench for me. My mother had passed away with cancer not long before this, leaving me desolate with grief; and all in all, this last incident was more than I could bear.

Milton Hare called me several times, trying to convince me that my work was indispensable. That was hard to believe, so, not until Mr. Wilkins promised to put my lathe in the Research Department where I could work undisturbed, did I consent to return. He never fulfilled that promise, but, since there was no further opposition to my doing my duty, I continued working on the die until it was finished. Finding that it turned out workable anodes, Milton Hare called me up to the Research Department one day to meet some men who had come over from M.I.T. and from Sylvania to see the die; since they, also, had been trying for some time to develop such a die. I do not remember now who they were.

I came to Tucson, Arizona in 1946, shortly after the Lab closed. One doctor wanted me to remain for one year in the Robert Breck Brigham Hospital in Boston, under therapy for my back. That was financially impossible. I was there three weeks before leaving for Tucson. It was now two years since the surgeon who operated on me had given me a year to live. Now I wondered, myself, how much longer I could go on with the pain and other hardships I endured. Since I had no savings to sustain me , I had planned to sublet my apartment and rest a year in a warm climate, where expenses (I thought) would be almost nil.My plans did not work out and I have had to remain here in great privation. For six years I was unable to work at all and lived only on the rent money from my Steinway grand piano, and finally was forced to sell it. Just recently have I felt able to try a full-time program of piano teaching again. It was a music Fellowship with Nadia Boulanger that took me to Boston in 1941, and lack of funds for living expenses that brought to my attention Mr. Wilkins' Ad for women with a knack for machinery, and hence my employment at Radio Research Lab.

On September 18th of this year I was able to rent a small house and a piano only because two pupils paid me far enough in advance for their lessons to afford me one month's rent. I have had to move three times since July because twice my landlords sold their property and once from a friend's home where I stayed until I could find a suitable place for a studio. Now, after just three months here, I find the acquisition of pupils so slow and other jobs so rare that the 18th of this month (date of rent due) is swiftly approaching to find me penniless, unless I can get some remuneration from some of my past efforts. I have tried everything short of public welfare, (which would be the last humiliation I could bear) but without results.

If you have borne with me this long, I hope you will forgive this long explanation, which seemed so necessary to make clear the purpose of my letter. My thought, inspired by re-reading some old letters, among them what I quoted from Milton Hare, was this: if the Donutron, containing the anode which I made, was patented, and the die, which I designed and made, are being used commercially by Sylvania, would there not be some way by which you (since you are titled and respected) could appeal to them to grant me some share in their profits?? I realize that I signed a release of any rights to developments made in Government employ during the war, but if the Government has released these developments to a company for commercial use, would that not entitle those involved to their share? As you can see, I do not understand how these business ramifications are arranged. That is why, in my desperation, I am appealing to you to find out if my part in the development of the anode and die for the Donutron will be appreciated enough by whoever is benefitting from it, to grant me some help in my dilemma.

So that you will know that I am neither ignorant nor idle, I will tell you that I have taught piano(irregular piano pupils) for thirty-five years, even while doing other work. I have had my sculpture in regional and one national Art Exhibit. You know something of the work I did at Radio Research Lab. I built, with my own hands, a small, one-room house, which I wired for 220-volt service and put in the plumbing myself and then sold after ten years in it, because I became so ill I nearly died. While working in the University Library here for three years, I used a small, self-inking counter-stamp, which I devised and which we believe has no duplicate on the market. A businessman here, to whom I showed it, felt that it had still other uses and was truly practical. But I have neither the financial means, nor the business knowledge to benefit from any of these pursuits.

I am becoming unutterably exhausted from these seemingly fruitless efforts to make a bare living and keep a roof over my head; when, surely what I have done should bring me that meager a reward. My income at this time is only five dollars a week, with a small check due in probably three more weeks for some temporary work I did.If this sounds like a complaint, please forgive me, for to be in a position to feel the necessity for its writing such a personal letter, is humiliation enough.

I realize that it will take great understanding and immediate and sympathetic action to help me. After endless effort to find a solution, without results, I could think of no other possibility; and I cannot but feel that only a man of your stature and experience could accomplish what I have proposed.

It was with great sadness that I learned of Milton Hare's death. If Dr. Crawford is still living, he may remember me. He wrote me a wonderful recommendation when I left the Lab, but my health has not allowed me to use it. If there is anyone at Sylvania who can fulfill my appeal, he would still need verification of my claims. That is why I have attempted to recall myself to you and have imposed on your valuable time to this extent. Please believe that I would not have done so under any less than really desperate circumstances.

If it is not asking too much, please let me know, at your earliest convenience, what hope you can offer me. My deadline is December 18th.

Most respectfully and gratefully yours,

Frances C. Grow.

January 6, 1964

Mr. Edward G. Martin
880 Church Street
Winchester, Massachusetts

Dear Mr. Martin:

In clearing out a pile of papers over the holidays, I came across a note that my secretary had made regarding a telephone call from you which I believe never got answered.

There are a lot of interesting things going on these days in electronics and related subjects that can make use of expert knowledge of many types. While it is not possible for me to be of much direct help in placing you in touch with such activities, I can make the general observation that the Boston area is one of the liveliest places in the country for such work. Accordingly, if you do want to re-enter activities of this sort, I think there is not much point of looking further than your own local territory even though there are other places that are active, as for example, the region around Stanford, Long Island, the Washington area, Southern California, etc.

It was good to hear from you, even though indirectly. I was interested in the success you have had with the patent on the inductosyn.

Sincerely,

F. E. Terman

RECEIVED
FEB 24 1964
PROVOST'S OFFICE

518 Dryden Road
Ithaca, New York
Feb. 24, 1964

Dr. Frederick E. Terman
Vice President and Provost
Stanford University
Palo Alto, California

Dear Dr. Terman:

After so many years allow me to reintroduce myself. And if you don't remember me please do not feel embarrassed - I was one of many secretaries at the Radiati on Lab during "those" days. I worked for Mr. Byrne and Elizabeth Mudge was my best friend. I was formerly Bebe Ross from Nova Scotia. Does it ring a bell?

Today I was looking thru some college catalogues and came across your name. It brought back so many memories. Wally Caufield - Cahill and Ed. Fry. Where is Fry now? I would love to see him or hear of him.

Since I will be available for a position in Septembæ r I thought you might be interested in having a look at my file from the Cornell Placement Bureau and you might have some suggestions for me.

I am divorced - 40 - have 3 children. My ex-husband is a doctor and serving as a Colonel in the Army overseas. The children are with him until Sept. 1965. I started college when we separated and got a B.A. in 2½ years at Western Michigan University in Kalamazoo and then came to Cornell in graduate Anthropology and Psychology in Sept. 1962. Recently I have decided to stop with the M.A. in June. I lack a year of residence and a thesis for the Ph.D. but it became a matter of values. I would just be beginning my thesis when the children return and first and foremost I must be a mother. So - I am inquiring re Dean work or similar work on a college campus.

My thesis is being directed by Dr. John Summerskill, Vice President of Cornell and my special graduate committee consists of Chairman, Dr. Harry Levin (at Stanford this week), Dr. William Lambert and Dr. William Dilger. My fiɘd now is Child and Social Psychology and Personnel Administration.

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My thesis is being directed by Dr. John Summerskill, Vice President of Cornell and my special graduate committee consists of Chairman, Dr. Harry Levin (at Stanford this week), Dr. William Lambert and Dr. William Dilger. My field now is Child and Social Psychology and Personnel Administration.

The strong emphasis is at the adolescent level and my thesis is entirely with Freshman students and Student/Faculty relationships.

I will be entirely free to go anywhere and will not settle for just a job. I've passed thru and beyond the Junior League stage of life and less pressures and more contact with students appeals to me.

I'll enclose a picture to remind your memory. Do you have a recent address for Elizabeth? Thank you for any suggestions you might have and if you so desire, I'll have my file forwarded to you.

With best personal regards to you, Dr. Terman,

Sincerely,

Bebe Buszek

Beatrice Ross Buszek

March 5, 1964

Mrs. Beatrice Ross Buszek
518 Dryden Road
Ithaca, New York

Dear Mrs. Buszek:

Your recent letter brings back a lot of memories of a very interesting period. I do place you, although my recollection was that your activities at RRL did not involve much direct dealing with me personally.

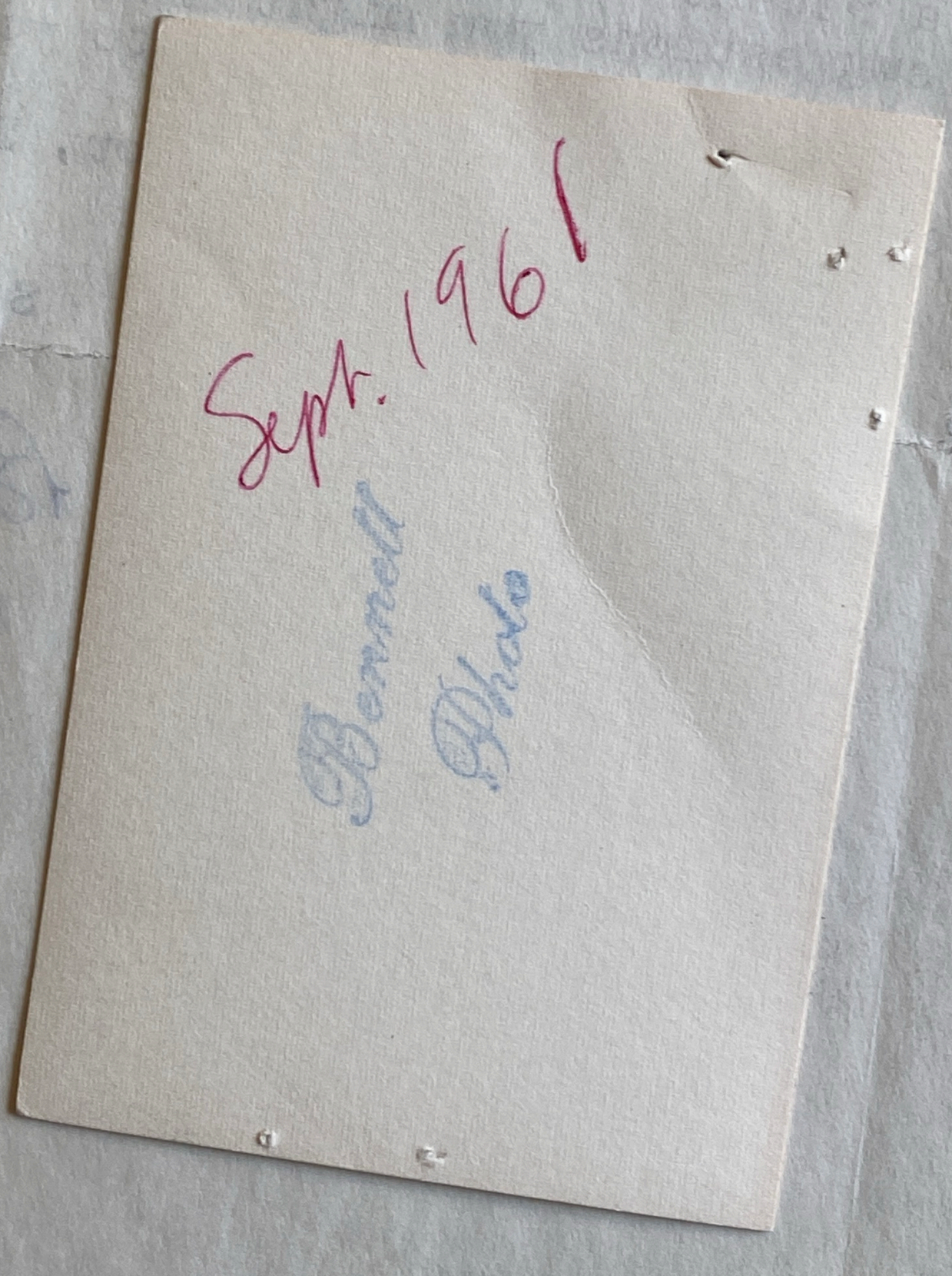
Your letter does not make entirely clear just the type of work that you are seeking. You say, "I am inquiring re Dean work or similar work on a college campus." Do you mean by this something related to the Dean of Women and her organization?

I do not know what the present situation is regarding our Dean of Women's staff for next year, but from time to time openings do develop and if this is what you have in mind I will bring your availability to her attention. On the other hand, if your objective is in some other direction, I will also do what I can there if you will give me an appropriate definition.

John Byrne is with Motorola at Phoenix, Arizona. The Byrnes built a new house last year and are probably settled in Phoenix for the rest of their lives. Elizabeth Mudge is Personnel Director at the Providence Hospital in Providence, Rhode Island.

Sincerely,

F. E. Terman


Sept. 1961
Bernard Randall
Photographer

March 5, 1964

Mrs. Beatrice Ross Buszek
518 Dryden Road
Ithaca, New York

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Sincerely,

F. E. Terman

RECEIVED
MAR 13 1964
PROVOST'S OFFICE

518 Dryden Road
Ithaca, N.Y.
March 9,1964

Dr. F. E. Terman
Stanford University
Stanford, California

Dear Dr. Terman:

After writing to you I felt somewhat abashed at being so presumptuous on such slight acquaintance but seeing your name brought back so many memories to me. After my divorce I just didn't have the heart to write letters and lost touch with old friends. I really wrote to get back in contact with Elizabeth and the Brynes.

Since I was in the midst of looking for a position I took the liberty of including this in my letter. After all, I am bright and motivated and well-trained and have the rest of my life to give to some meaningful endeavor. I boldly thought you might have some knowledge of a possible location for someone with my qualifications.

Your confusion as to my goal is quite understandable. I originally intended to do college teaching and was nominated for a Woodrow Wilson and encouraged by all my Professors. When I decided the timing of the Ph.D. was off balance with my other responsibilities, doors silently closed on all sides of me! I began to consider the area of Dean of Women, Counseling or part-time teaching and Dean work in a small college. My Graduate Committee reinforced me in this consideration and I have worked with the Academic Dean in the School of Arts and Sciences this past semester.

Since writing to you I have reevaluated in the light of the reality-testing in actual Dean work and the ages of my children. I feel that the work will involve considerable after 5 commitments and will deal almost exclusively with problems. I have been told that I do well in the latter area but personally I derive much more satisfaction working with the healthy unrealized potential of students. This could apply to organizations.

With this rather sobering realization I talked with my Director, Dr. Summerskill who reinforced my decision to consider other possibilities. He felt I could do the work but he hated to see me under the almost certain pressures involved - at least while the children are still young. I will have a part-time housekeeper when they return and they are all in school so I can be free to do full-time work.

Both Dr. Summerskill and Dr. Muller who is Head of the Center for International Studies on campus, have encouraged me to consider Administrative work with a Foundation or similar organization. They are both making some contacts and feel this is my real strength. I would be happy to have Dr. Summerskill's secretary send you a copy of his recommendation. I have not seen it but he was very positive when he talked with me and felt I should work with developmental ideas and in an area where there is stimulating adult contact.

So - that is the story. I am being selective as I feel my choice is very important. At times I wonder if there is a niche in society for displaced women but like most things, perhaps it is up to me to make the niche. I would appreciate any suggestion or possible contact you might suggest.

It was very flattering that you did recall me. I, of course, felt that I knew you because I dated several of your disciples and knew Elizabeth so well and worked for Mr. Byrne. I shall enclose a brief description of the years in-between for your information in case you have any further suggestions.

Thank you very much.

Sincerely,

Bebe Buszek

Beatrice R. Buszek

BEATRICE ROSS BUSZEK Born:July 1, 1922 Divorced
3 children: 7, 9 and 13

Education

Graduated from Windsor Academy, Nova Scotia.
Audited approximately 80 hours of college courses. Mainly in area of History, Intellectual History, Philosophy and Clinical Psychology.
B.A. - Western Michigan University June 1962. (Psychology & Sociology)
(degree was attained in 2½ years with honors)
M.A. - Cornell University - June 1964. (Child Psychology, Social Psychology, Ethology plus 1 semester in Anthropology. Second year emphasis has been on Administration and thesis is under direction of Clinical Psychologist and Vice President of Cornell, Dr.Summerskill)

Course work is completed but lacking one year and thesis for Ph.D.
Proficiency in French and Qualified in German plus 4 years of Latin.

Experience

Secretary, U.S. Naval Attache, Halifax, N.S. 1 year
Secretary, RRL, Nr. Byrne 1½ years
U.S. Naval Intelligence - Secretary - Long Island, Maine 1 year
Liaison Officer, U.S. Navy - stationed in Alaska 13 months
Cadet Nurse Corps, Mayo Clinic - (was engaged to a pre-med student and decided to prepare myself for marriage to a doctor)
Married May, 1945.
Secretary and Nurse - Dr. A. M. Waldron, Ann Arbor, Michigan - to 1950.

From 1950 until separation in 1959:

Lived in San Francisco where husband interned at Presidio
Adopted first son there
Very active in Junior League and League of Women Voters
Two years in Alabama in Army
Very active in civic and social activities
Private practice in Lansing, Michigan for five years
Adopted daughter - an international adoption
Very active in Junior League and League of Women Voters and flew in Civil Air Patrol. Natural son born.
Separated and moved to Kalamazoo, Michigan where son was in private sch.
Started college to give focus and meaning to my life at a time when there was much hurt and confusion. Children were 2, 5 and 8.
President of League of Women Voters two years.
(Worked as Probation Officer for Delinquent Girls 1 semester.
(Worked as Counselor for Emotionally Disturbed Children 1 semester.
(Worked as Campaign Manager for G. Romney at W.M.U.
Above three were projects in connection with my University work.

Received Graduate Fellowship at Western Michigan University
$1500. plus tuition and fees.
N.I.M.H. at University of Michigan in Psychiatric Social Work
Assistantship at University of Chicago in Anthropology
Armstrong Trust Fellowship at Cornell University covering all expenses plus $1700 tuition and fees. (This one I accepted and it would have extended through the Ph.D.)
Nominated for Woodrow Wilson Fellowship by Psychology Department

RECEIVED
APR 27 1964
PROVOST'S OFFICE

OFFICE MEMORANDUM • STANFORD UNIVERSITY

DATE: 15 April 1964

TO : H. D. Winbigler
Dean of Students

FROM : Robert J. Wert, Vice Provost and
Dean of Undergraduate Education

SUBJECT:

Attached is a Cornell University Educational Placement Bureau file on Beatrice R. Buszek. She worked in Fred Terman's laboratory during the war and he thinks her quite capable.

When you are through with this, return it to me.

Bob

4/17/64 TO Bob,
We have no openings which would be suitable for her. Don

RECEIVED
APR 16 1964
DEAN OF STUDENTS OFFICE

Dryden Road
aca, N.Y.
il 22,1964

s so much
t also be
d my "hobby-horse
inning in September.

x colleges for
ally accepted a
- Hampton Institute,
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s to you, Dr. Terman.

Very sincerely,

Beatrice R. Buszek

Beatrice R.Buszek

RECEIVED
APR 27 1964
PROVOST'S OFFICE

518 Dryden Road
Ithaca, N.Y.
April 22,1964

Dr. Frederick Terman
Stanford University
Stanford, California

Dear Dr. Terman:

Your nice letter was so much appreciated that I thought you might also be interested to know that I have found my "hobby-horse" and will leave Cornell for work beginning in September.

I was accepted at six colleges for teaching jobs in Psychology but finally accepted a position at the last one on my list - Hampton Institute, in Hampton, Virginia. As you may know, Cornell and Yale are sponsoring the up-grading of faculty and educational facilities there and working closely with President Holland, an ex- All-American from Cornell.

On Dr. Summerskill's recommendation I was offered the appointment in Psychology but it is quite flexible as I shall also have charge of developmental plans for their African project in Sierre Leone. I am quite excited about the prospect of putting some lip-service in action and working with the challenge it offers me. I shall return to Cornell in 1967 to spend one year and finish my thesis for the Ph.D.

My very best regards to you, Dr. Terman.

Very sincerely,

Beatrice R. Buszek

Beatrice R.Buszek

You are probably aware this is a Negro college and striving for excellence + integration!

April 30, 1964

Mrs. Beatrice R. Buszek
518 Dryden Road
Ithaca, New York

Dear Mrs. Buszek:

It was thoughtful of you to write me regarding the way your plans are developing. I am pleased that you have lined up a position which you can take on with enthusiasm, and which will fit into your personal life.

In view of the fact that you had a set of your reference papers sent to me, I have been checking on the situation at Stanford. Up to now I have not been able to locate anything appropriate, and in view of your new position will discontinue this exploration which is not likely to be productive anyway. Our undergraduate teaching in Psychology is all done by people who are concurrently involved in graduate instruction and in the supervision of PhD students. While there exists the possibility of a vacancy developing in our Dean of Women's set up, none have turned up yet, and moreover you had indicated earlier positions of this type really do not fit your personal situation very well.

You have my best wishes for success in the new venture.

Sincerely,

F. E. Terman

October 15, 1965

Dr. John Foster
Director Defense Research & Engineering
Department of Defense
Pentagon
Washington, D. C.

Dear John:

Enclosed herewith is a copy of the photograph that I promised to send you. It came from a scrapbook that was prepared for me at the end of the war; either you or someone else brought the original picture to RRL from Italy.

Apparently you really had a full house on this occasion. The little gallery is packed, and there are people standing in the rear.

The reports that trickled back to Cambridge on your activities in the Mediterranean were that in addition to making your talks instructive they were also highly entertaining. This no doubt accounts for the intense concentration you are getting from the audience in the picture.

Also enclosed is a copy of the press release that we put out in late 1945 on countermeasures in the war. You may wonder why this is written almost anonymously, without mention of RRL except in the "Note to editors and readers" on page iv, and without a single individual being named. The explanation is that because of interservice rivalries in the jockeying for postwar position, it was only with the utmost difficulty that we got the three services to agree with each other on anything. Charles Oliphant spent about two weeks in Washington negotiating behind the scenes with the colonels, captains, generals and admirals. As a result of persistence, tact, and resourcefulness that represented a magnificent bit of diplomacy on his part, Charlie finally got unanimous consent to the release of the story on the condition that it be written in this unusual way. The story is factually correct, because the final draft was written by us, and we had no postwar position to protect or build up. You can easily read between the lines and deduce who did what; thus the references to an NDRC laboratory and to NDRC engineers associated with radar countermeasures obviously meant RRL and its people.

Very truly yours,

F. E. Terman
Provost Emeritus

Enclosures

P. S. You may keep both the picture and the pamphlet "Electronic Warfare." I have the original of the picture, and a number of extra copies of the pamphlet.

Foster Johnson
Calling re critical need
Harold Brown Investigation w/ Johnson
Looking for deputy
[illegible] have experience in electronics

October 22, 1965

OCT 27 1965

DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING
WASHINGTON 25, D. C.

OCT 21 1965

19 OCT 1965

Dr. F. E. Terman
Provost Emeritus
Stanford University
Stanford, California 94305

Dear Dr. Terman:

Thank you very much for the copy of the photograph taken in Italy and the press release on countermeasures. The picture brought back recollections of the talk and of some of the listeners on that occasion.

I was much interested in the story as written in 1945.

Sincerely,

Johnny

John S. Foster, Jr.

yer,

15

October 22, 1965

OCT 27 1965

Dr. John Foster
Director of Defense Research
and Engineering
Department of Defense
The Pentagon
Washington 25, D. C.

Dear Dr. Foster:

Your friend Gene Fubini has suggested that I write to you concerning the 1966 Annual Reunion meeting of Post War Division 15 of NDRC. You may know that this informal organization has held reunion meetings in New York every year since 1946. Among the people who often attend, in addition to Gene Fubini, are Fred Terman, John Byrne, John Dyer, Wm. Salisbury, Peter Goldmark, and many others whose names you would recognize. Several members of this group have agreed that you would be an ideal speaker for the next meeting on March 24, 1966 in New York. The date is selected because it is Thursday of the week of the IEEE National Convention, which is often attended by many of the people who were connected with radio and radar countermeasures work and Division 15 during the 1942-1946 period.

Usually there are about fifty people at the dinner meeting. The meeting is very informal and the speakers have usually talked for about half an hour and answered questions from the audience for a few minutes. The meeting starts about 6:00 p.m., dinner at 7:00, speech at 8:00, and adjournment at 9:00 p.m. A list of those who spoke at these annual meetings in the past is attached.

Because of your early participation in the work of Division 15 at RRL under Fred Terman, and your new assignment as Director of DDR&E, we are especially eager to have you meet with us and give us your thoughts on your new job or any subject which you may feel will be appropriate to this audience. We are attaching the membership list.

I hope you can join us on March 24.

Yours very truly,

Original signed by
C. G. Suits

CGSuits:fw
cc: Dr. F. E. Terman
Dr. E. G. Fubini
Mr. John N. Dyer
Mr. John F. Byrne
Mr. R. W. Larson

Foster, John

Calling re critical need.

Harold Brown terminates today + John Foster takes over

Looking for deputy

Must have experience in electronics.

Oliver is his #1 candidate.

August 24, 1966

Mr. A. O. Wilkins
Highlands
Bridgton, Maine 04009

Dear Art:

It was indeed thoughtful of you to send me a copy of the July 14 Bridgton News. It is a nice write-up, and a fine tribute to you.

Time slips by, and a year ago I also retired in the Wilkins manner. That is to say, I am engaged in several part-time activities to the point where my wife claims I now hold three half-time jobs. Actually, I am doing some part-time work for Stanford, and am putting in something approaching half-time in Dallas, Texas, as president of the SMU Foundation for Science and Engineering. My job in this connection is to help Southern Methodist University strengthen its engineering program. Earl Cullum, whom you will remember as Associate Director of RRL, is on the Board of Directors of the Foundation, and I see him regularly.

In addition, I have been doing miscellaneous consulting, mainly on educational projects, and spent last December in Russia, looking at engineering and science education in the Soviet Union for the U. S. Office of Education. I keep my residence at Stanford, but travel quite a bit.

I see Harold Elliott occasionally. He is almost completely retired, but does quite a lot of traveling in Europe. I also see John Byrne with some regularity -- the last time only a few days ago. He is the same as ever.

Very truly yours,

F. E. Terman
Provost Emeritus

FET:rs

Our LRRL
RRL

January 3, 1967

Dr. John H. Van Vleck
57 Fayerweather Street
Cambridge, Massachusetts

Dear Van:

It gave me something extra for Christmas to read in the paper the morning of December 25 that you were one of those who had been selected to receive the National Medal of Science.

In my personal scheme of things, you were always one of those very solid and dependable senior statesmen it is so satisfying to know. I am glad to find that others think the same way.

Again, my congratulations.

Sincerely,

F. E. Terman
Provost Emeritus

FET/s

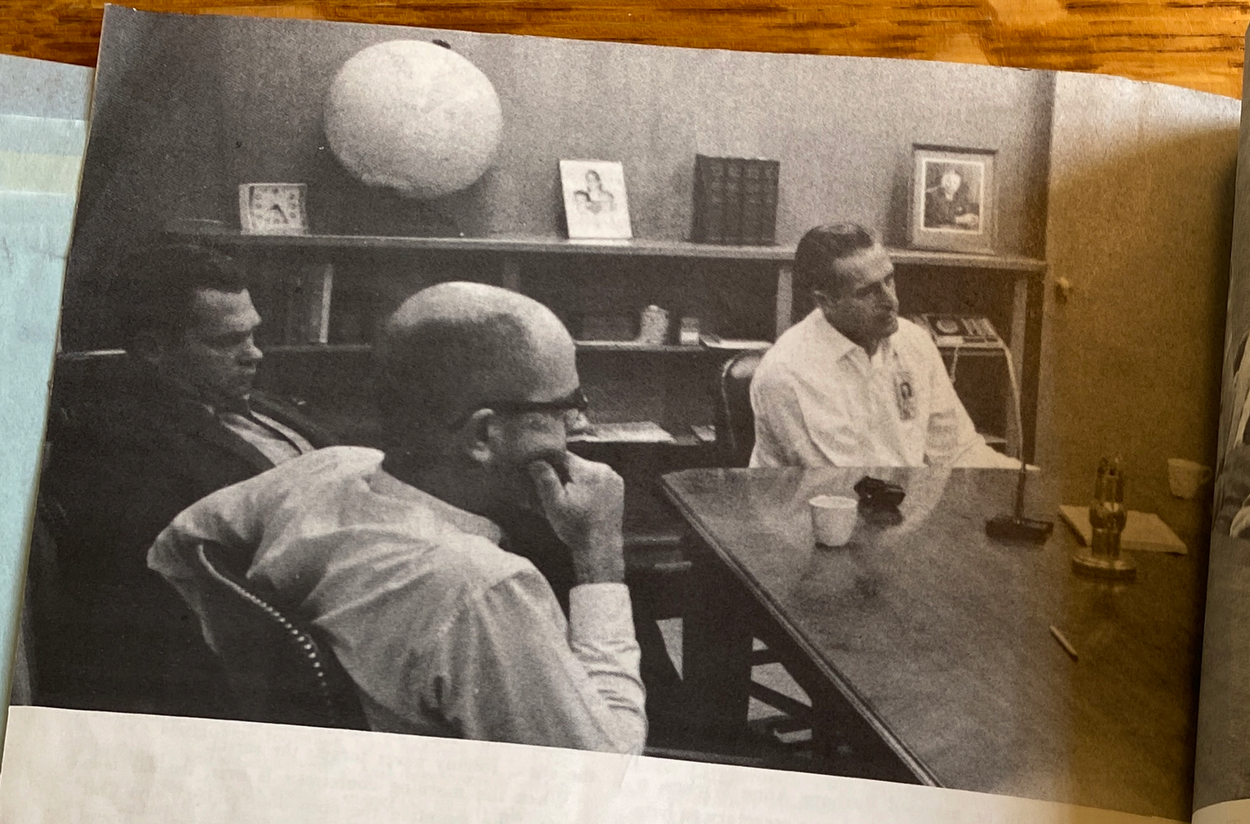
"FAR OUT WITH THE ATOM"

RRL

LRL

"FAR OUT WITH THE ATOM"

LAWRENCE RADIATION LABORATORY - LIVERMORE, CALIFORNIA



FIRST ORDER OF BUSINESS each morning is the staff conference. By the time Johnny reaches his desk (the conference table above), he has doffed tie and coat and is ready for serious listening and incisive questions. Right to left are Michael May, associate director, nuclear design; Forrest Fairbrother, staff assistant; T. C. Merkle, associate director for Project Pluto; Carl Haussmann, associate director for military applications, and Duane Sewell, associate director, support.

at any time of day or night is routine at Livermore. The computers work around the clock. Stores and equipment are always available for scientists who want to "try some things"—which often occurs after hours.

Johnny explains it this way: "The idea is that research is fun. If we're having fun, then our effort is more effective. The hours don't matter. The work isn't work. This is the spirit of Ernest Lawrence."

Scientists find it easy to admire Foster not only for his personal qualities but also for his professional competence. "He was the best physicist in our group," a member of Foster's old team on small weapons recalls.

Johnny has definite ideas about the kind of place Livermore is and should continue to be.

In addition to being a place where work is fun, it's a place for young men, says Johnny. "There are few places where a young graduate can very quickly make an important contribution to his country," he asserts. "Livermore is high on a very short list."

Johnny has no snooty notions about the division between basic and applied research. "We do basic research, but our main job is applied research. Our job is to fill the big gap between the high highbrows and the low lowbrows. We have to keep a grip on both worlds, and occupy the space between."

A newcomer from a well-defined organization or a government agency tears his hair at the organizational system at Livermore. "We don't have a formal system of channels or chains of command," Johnny volunteers, "but we're strong on who is responsible for getting what jobs done." Maximum freedom in research and organizational informality were inherited from an unwritten motto Ernest Lawrence stamped on the parent Laboratory in Berkeley in the 1930's.

THE RESULTS of having a policy of very little policy speak for themselves in the innovations coming from Livermore. At the present time, far more weapons in the U.S. stockpile are from Los Alamos, because it is older. But Foster says the input from Livermore today equals that from Los Alamos. A friendly, healthy competition exists between the two laboratories, and they work well together on problems. Los Alamos' distinction has continued through the years.

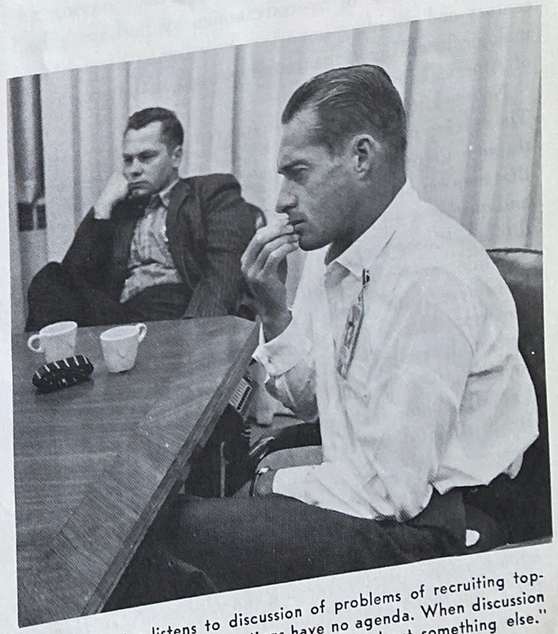
Two small sites complement the extensive research facilities at Livermore. One is Site 300, 15 miles from Tracy, in isolated Corral Hollow where 230 staff members work. This is a hydrodynamics laboratory, containing five bunkers for test firing high explosives assemblies.

A second installation is maintained at the Nevada Test Site. The staff at Mercury lays essential ground work for the tests of Livermore devices.

Livermore scientists had some ideas for nuclear propulsion of rockets, and the AEC assigned them the job of developing a nuclear ramjet propulsion reactor. Project Pluto's first experimental reactor, Tory IIA, was put through successful tests at Nevada last year, and a more sophisticated model is already well advanced. From the

ng the creators of Livermore visualized the de-
nt of peaceful, as well as military, applications
ic energy. Project Sherwood, York's pet dream,
ng from the beginning. The idea is to cause
sion of hydrogen nuclei, with the consequent
of energy. The temperatures required are about
llion degrees C. Gas at such temperatures cannot
ined simply in a container, because contact with
ls cools the plasma of stripped hydrogen nuclei.
e approach is to confine the plasma in a magnetic
"a magnetic bottle" — preventing the gas from
contact with the container walls.
mber of novel approaches to the problem have
ted at Livermore in a program under the direction
C. M. Van Atta. There are machines like Toy Top,
Top, Levitron, Astron, and Alice. At Berkeley there
Homopolar and Pinch machines. Magnetic mirror
hines, visualized by York and developed under Dr.
ard Post, have been prominent in the program. So
the achievements with Dr. Fred Coengsen's Toy Top
irror machine have not been exceeded. The instrument
chieved the most advanced approach to a practical ther-
onuclear reaction, reaching temperatures of 40 million
egrees C and maintaining the reaction for periods of one
ten thousandth of a second.

There is a long way to go—perhaps decades—before practical thermonuclear reactors are available for power production. But the game is surely worth the candle. For the development of thermonuclear power would make the



PENSIVE, Foster listens to discussion of problems of recruiting top-flight personnel. Morning meetings have no agenda. When discussion bogs down, he shifts gears with: "Let's talk about something else."

waters of the world available as a source of power—more energy than the world could use for the indefinite future.

One of the most imaginative and challenging peaceful uses of atomic energy is wrapped up in the concept of Project Plowshare, a Livermore original. The idea for turning the nuclear sword into a plowshare started some years ago with York, Brown, Teller and Dr. Gerald Johnson, former Plowshare leader and now chairman of the Military Liaison Committee. It was Brown and Johnson who hardened the idea into a going program.

Plowshare involves the use of nuclear explosives for a wide variety of large-scale work—"geographical engineering" Teller calls it. It embraces the concept of massive excavation, inexpensive mining of marginal mineral deposits, cutting canals, generating power in underground caverns, mass production of radioisotopes, using the power of the atom to do jobs that are now impossible.

So far, two Plowshare experiments have been performed: Gnome, the creation of an underground cavern in a salt bed near Carlsbad, New Mexico, last fall; and Sedan, a shallow underground explosion which created a giant crater in Nevada in July.

On the basis of these two experiments and other research, Dr. Gary Higgins, present leader of Plowshare, believes nuclear excavation is practical as a competitive technique with other methods. Containment and fixation of radioactivity are sufficient to indicate that this factor is not a decisive issue.

Computation techniques have progressed to the point where many effects from Plowshare detonations can be predicted with high assurance, Dr. Higgins states, and it is also now possible to "tailor" nuclear devices to specific Plowshare tasks. Plowshare has given scientists a powerful new tool of basic scientific research, already having advanced the science of hydrodynamics by perhaps a half century and shedding important new light, through seismological tracking of the tremors set up, on the geophysics of America's mid-continent.

No one knows now what the future holds for Plowshare. The carving of new harbors? Slicing a new Panama Canal through Central America? It seems likely that big jobs that man cannot now do or that can be done more cheaply and quickly with nuclear explosives, will become a reality through Plowshare.

While applied work is the lion's share of the effort at Livermore, fundamental research programs occupy an important place. With the fast Livermore computers, the first multilevel model of the atmosphere — useful in weather research and prediction — has been developed. Using the same instruments, new light has been shed by Dr. Stirling Colgate on the history and evolution of Supernovae. In physics, Livermore space packages have revealed new details about the radiation belts surrounding the earth. In the future, a Livermore device may ride with a lunar probe, and relay definite knowledge of the elements lying on the surface of the moon.

TO KEEP THE vast Livermore projects going, extensive, modern research facilities have been developed. Outstanding is the computer facility. Some problems of nuclear weapon design can be attacked only through computation, and the same is true of many scientific problems.

Among Livermore's first computer acquisitions was the UNIVAC. But this machine was retired several years ago —too slow. To replace it, Livermore acquired such machines as the LARC, which could do in a few hours the work the UNIVAC could accomplish in two years. Early this year an IBM's STRETCH went into operation. Since then it has performed about 10 trillion computations—about equal to the work performed in the years before that by all of the machines at Livermore. In addition, Livermore has three IBM 7090's and a number of smaller machines—all told, one of the most extensive computer complexes in the world. And on order is a new supercomputer, the CDC-6600, which will make STRETCH seem like a slowpoke.

The other facilities are extensive. They include such items as a reactor (Livermore Pool Type Reactor), critical assembly installations, a 90-inch cyclotron, a linear accelerator, Van de Graaf generators, etc.

To strengthen the fundamental research program, Foster recenly formed a physics department, with Dr. Theodore Merkle, head of the Pluto Project, as its head. Under it are the physics department, computation and theoretical division, and neutronics.

Livermore's young Turks are a wide-ranging crew. They commute regularly from Livermore to the test site at Mercury, Nevada. They are regularly to be found in Alaska, New Mexico, Louisiana, Hawaii. When Pacific tests are underway, they fly there in large numbers. They make appearances in Australia, the United Kingdom and Geneva, as advisers and consultants, and on laboratory projects.

In a letter to McMillan and Foster on Livermore's 10th birthday, President Kennedy had this to say: "The Lawrence Radiation Laboratory at Livermore, California, has made many substantial national contributions and the advances brought about by the Laboratory's efforts have been highly significant. . . . The success of the Livermore Laboratory is, of course, a measure of the outstanding men and women associated with its work. . . . It is, therefore, with pleasure that I extend my personal congratulations and those of our country to the Lawrence Radiation Laboratory at Livermore on its 10th anniversary."

The air at Livermore is electric with excitement and adventure. Johnny Foster figures that his responsibility is to keep it that way — maintaining the "far out" stance necessary for free world defense and human welfare. ◀

This article was prepared at the request of CALIFORNIA MONTHLY *by Daniel M. Wilkes, assistant to the director of the Lawrence Radiation Laboratory. Wilkes is a well known science writer, serving the University in that capacity for many years.*

RRL

Chaff

Each plane carried 90 #

20,000 pieces per pound.
2000 x 3 = 6000 pieces per 5 oz package.

750 planes in a raid.

90 x 20,000 x = 1,800,000 pieces plane

1.8 x 75 = 1,350 million pieces per raid.

RRL

FEB 23 1967

HARVARD UNIVERSITY

DEPARTMENT OF PHYSICS

LYMAN LABORATORY OF PHYSICS
CAMBRIDGE, MASSACHUSETTS 02138

February 20, 1967

Dr. F.E. Terman
Room 174, McCullough Bldg.
Stanford University
Stanford, California 94305

Dear Fred:

Many thanks for your note congratulating me on my receipt of the National Medal of Science. It is very gratifying when I find that other people are pleased besides myself.

I have been very slow in replying so that I could tell you a little about the ceremony. It was in the East Room of the White House where L.B.J. presented the awards. Afterwards there was a luncheon in the new rooms of the State Department which are very impressive. The Vice President gave an excellent informal talk. After that we had a nice private tour of the White House.

Folder: 13
1953 - 1970

RRL.

FEB 23 1967

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DEPARTMENT OF PHYSICS

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February 20, 1967

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Room 174, McCullough Bldg.
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Van

[John Van Vleck]

222 BROADWAY
NEW YORK, N. Y. 10038

April 30, 1969

DR. F. E. TERMAN
445 El Escarpado
Stanford, California 94305

Dear Fred:

Thanks for your note. We share your confusion. Actually, the situation is as follows: our records date to 1955. Your attendance has been excellent since then, although I show you absent in 1955 and 1957. Beyond that 100%.

Since my last note, I had more opportunity to study your paper on the development of an engineering curriculum. It is certainly interesting to realize what you have been able to accomplish in this area in taking an emerging school and converting it. I'm sure you must find a great deal of satisfaction in the results.

Best regards,

H. W. Albrecht

TO ALL DIVISION 15 MEMBERS

5 January 1970

Dear Jammer: 24 & 39th

The twenty-fifth anniversary celebration of Division 15 will take place on March 26, 1970 at the Williams Club in New York. This will be a very special affair and we expect that many old-timers will be there to swap lies of extraordinary quality. Hal Albrecht states that the facilities, the cuisine, and the decor will be entirely proper, considering the high caliber of the members (hot dogs and hamburgers).

Our plans include the production of a commemorative brochure for which your assistance is needed. Will you please send to me your photograph, and a story about yourself or any other more suitable subject that is "fit to print." We will then put together a first edition that all can savor in their declining years.

This letter is being sent to you now in the hope that we can get the necessary material to our print shop in ample time. After March first, don't send your stories and pictures to me, but bring to the meeting 100 copies gummed on the backs so that people can stick them in their brochures.

Sincerely,

John N. Dyer

Send your reservations to:

Mrs. Edie Corl
President's Office
AIL, a division of Cutler-Hammer, Inc.
Comac Road
Deer Park, New York 11729

AIL a division of CUTLER-HAMMER
DEER PARK, LONG ISLAND, NEW YORK 11729

OFFICE OF THE PRESIDENT

7 January 1970

Dear Fred:

We are getting underway with our plans for the Division 15 reunion. I would like to ask you to take a major part in the program, along with Guy Suits. It seems to me that the most suitable and interesting program that could be found would be for you and Guy to talk about the war years at RRL and Division 15. Enough time has now gone by that, even to those who were there, it will be a great pleasure to be reminded of the many things that happened.

I hope you will be able to attend and take part in the reunion in this way.

Sincerely,

John N. Dyer

Dr. Frederick Terman, President
Southern Methodist University
Foundation for Science and Engineering
Dallas, Texas

AIL a division of CUTLER-HAMMER DEER PARK, LONG ISLAND, NEW YORK 11729

OFFICE OF THE PRESIDENT

5 February 1970

Dear Jammer:

It is beginning to look as though Division 15 members are not particularly intrigued with the idea of a commemorative brochure. As of today, we have only received photographs and stories from the following people:

Guy Suits	John Granger
Gene Fubini	LaVerne Philpott
John Blewett	K. C. Black

Obviously, it would not make sense to produce the brochure unless we have material from a substantial proportion of the members who have been active. Therefore, if you feel that we should not go ahead with this project, please let me know by the end of next week.

We have reservations from thirty-three Jammers to date, so if you are planning to partake of the "hot dogs and hamburgers" and have not returned your reservation card, don't forget to do so.

Look forward to seeing you on 26 March!!!

Sincerely,

John N. Dyer

February 5, 1970

Mr. John N. Dyer
President
AIL
Deer Park
Long Island, New York 11729

Dear John:

I realize that some time has elapsed since you wrote me about the Division 15 reunion. Part (but by no means all) of this delay resulted from the fact that your letter was sent to me at Dallas. Although I carry on a part-time activity there, I still maintain my residence at Stanford, and am here most of the time. (My office address is on this letterhead, and the office telephone number is (415) 321-2300, ext. 2487; my home address is 445 El Escarpado, Stanford, California 94305, telephone (415) 321-1646.)

I will, of course, be pleased to take part in the program as you suggest. Guy has already talked to me by phone, and we have agreed on a division of labor.

See you in March!

Very truly yours,

F. E. Terman
Provost Emeritus

FET/s

cc: Dr. C. Guy Suits
"Crosswinds"
Pilot Knob, New York 12844

February 12, 1970

Mr. John N. Dyer
President
AIL
Deer Park
Long Island, New York 11729

Dear John:

As I consult my own schedule of commitments, it is increasingly clear that I will not be able to prepare a "fit to print" biography by March 1.

This is too important a document to toss off nonchalantly, and I just will not have the time in the next two weeks to do the kind of job that the solemnity of the occasion calls for.

I will, however, be ready with a talk for March 26, and this may disclose more than would the biography, anyway.

Very truly yours,

F. E. Terman
Provost Emeritus

FET/s

AIL a division of CUTLER-HAMMER DEER PARK, LONG ISLAND, NEW YORK 11729

OFFICE OF THE PRESIDENT

September 3, 1970

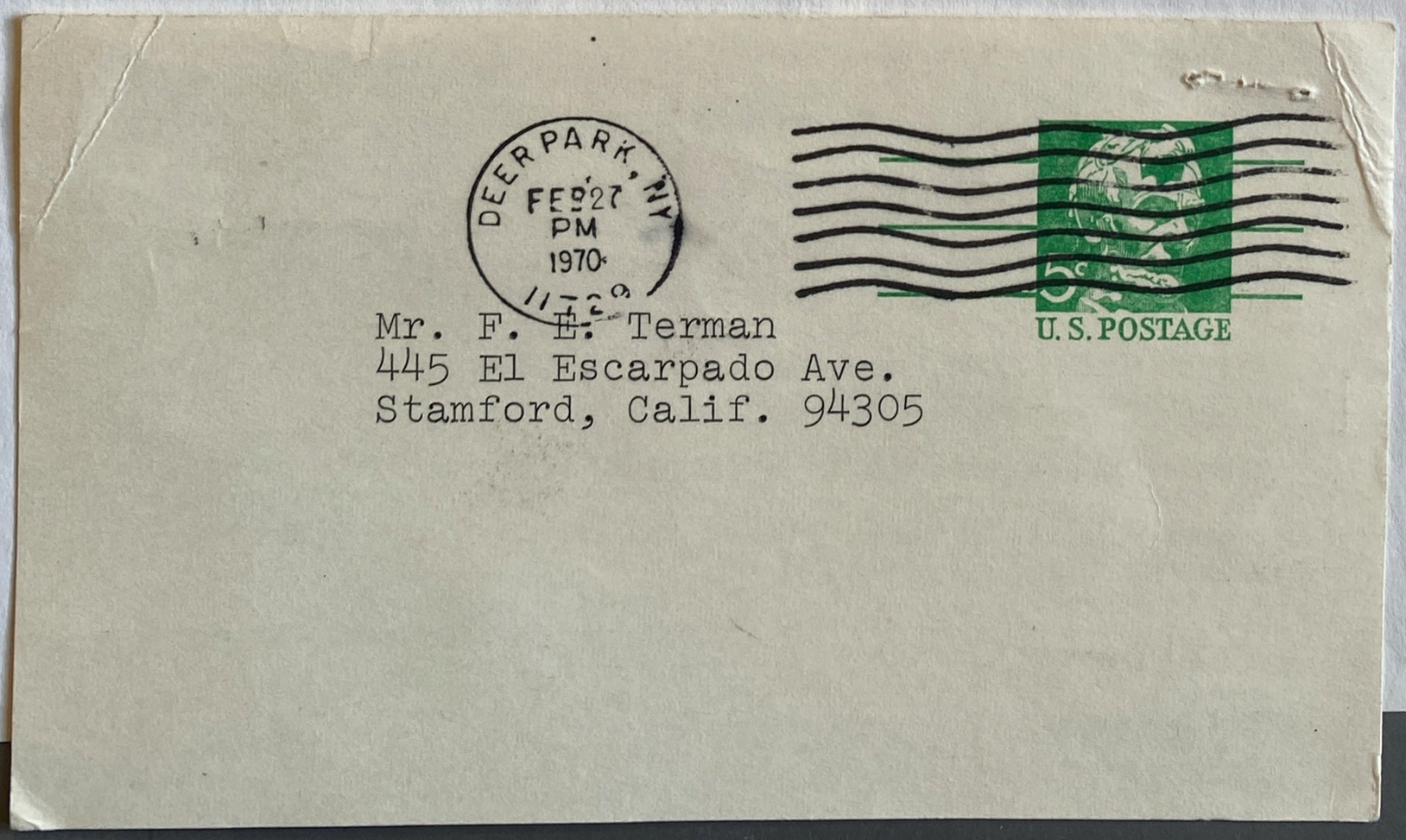
Dear Fred:

I thought you would be interested in the attached 25th Anniversary issue of the AIL Record. One could say that you had a substantial share in building this organization as you have many others. For all of this, we say thank you.

With best regards,

John N. Dyer

Dr. Frederick E. Termon
445 El Escarpado
Stanford, California



Mr. F. E. Terman
445 El Escarpado Ave.
Stamford, Calif. 94305

AIL Record

September 1, 1970 Vol. 16, No. 6

Twenty-Fifth Anniversary Issue

AIL'S First President

Hector R. Skifter

AIL a division of CUTLER-HAMMER INC.

Introduction

THIS IS A SPECIAL issue of the AIL RECORD commemorating the Company's 25th Anniversary. It is dedicated to all staff members of AIL since all of you have contributed your talents and skills in maintaining what AIL is—and has been— a dynamic organization. Special tribute is made, naturally, to that select group of AILers who have been with the Company since it came into being in September of 1945.

While much of the text that you read and many of the pictures that you see will dwell upon the past, nevertheless the issue is published to honor all of you; because all of you are AIL.

Most of what follows is a recapping of past events because this is the best way to tell the story of AIL. For those of you who have been with AIL for many years those events will stir up memories, for others they will be illuminating. The following pages present the notable, the unusual, the sad, the difficult, and the pleasant occurences which, together, reflect the story of AIL.

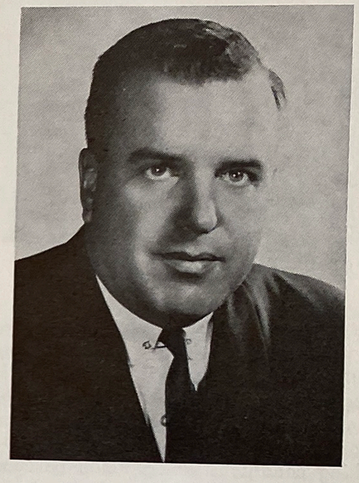
The laboratory's growth from a modest beginning into a recognized leader in the electronics industry is a success story. Through the broad talents of its dedicated employees, AIL has contributed significantly to the advancement of scientific progress in the field of electronics. Today, at 25 years of age, AIL is a company that has earned the respect of its many customers—from Federal, State, and City Governments and domestic companies to Foreign Governments and companies. AIL systems and equipments have been successful in fulfilling the needs of challenging technologies in diverse areas of interest and endeavor.

The pages that follow cover the period from the first opening of our doors (to some 111 employees) until today, when we stand as one of the largest employers in Suffolk County.

As you turn the pages you will see photographs showing people, places and equipments that you will recognize and others that you will not recognize. You will read some interesting facts about which you knew nothing—or about which you know a great deal. Whatever the case, hopefully you will find enjoyment in the magazine. Perhaps some humor in an anecdote, or a boyish face that awakens your memory will affect you pleasurably. We expect that everyone will find a chuckle, a smile, some satisfaction.

If you can spend but a moment and reminisce about how things were and, possibly, feel pride in knowing that you helped to shape the things that are today, then this issue has served its purpose. Regard it as a memento for the future—for each of you has in his own way given of your labors and yourself in the creation of this silver anniversary.

A Message From E. B. Fitzgerald



THERE IS TRULY something fresh and unique in AIL's 25th Anniversary. Certainly no business organization has had a more democratic beginning and none has had a greater sense of camaraderie and team spirit throughout its existence. In more ways than one, everyone in AIL can rightly feel that this is his anniversary, as well as his Company's.

Even more than that, AIL's development and growth over these past 25 years has been most remarkable. It has been substantial in its dollar dimensions and it has been superb in its professional and technological dimensions. Few other companies, started with similar objectives, have had larger sales and earnings growth; none has outstripped AIL in growth of professional competence and reputation in your fields of special emphasis.

On behalf of all Cutler-Hammer people everywhere, permit me to offer sincere congratulations to each of you at AIL for your part in such a stimulating and impressive quarter century of achievement. Indeed, those of us in the rest of the corporation feel a sense of pride in having been associated with you during half of that period. After the trials of the last year or two, I have every confidence that AIL is on the threshold of even greater new successes than those of the past.

AIL Record

Published monthly at Deer Park, New York, by AIL, a division of Cutler-Hammer Inc., for staff members and their families.

RICHARD J. SULLIVAN
DIRECTOR OF PERSONNEL

HOWARD J. GRESENS
DIRECTOR OF PLANT AND COMMUNITY RELATIONS

BERNARD W. MORRIS
EDITOR-IN-CHIEF

Many hands helped in preparing this special issue of the AIL RECORD. Much technical and chronological researching was required; keen judgments and reliable memories, as well as a profound knowledge of the company were essential. Discretion was necessary. These qualities were found in a combined number of staff members. Working together, their efforts provide what must be considered an interesting and factual account of the 25-year history of AIL.

Special thanks are due to those who contributed so much: Harold Hechtman, Phil Smith, Rod Simons, George Wilson and Bob Kachala. Many thanks, also, to Joan Bradley and Doris Glaser, and to the photographers, artists and illustrators in Publications.

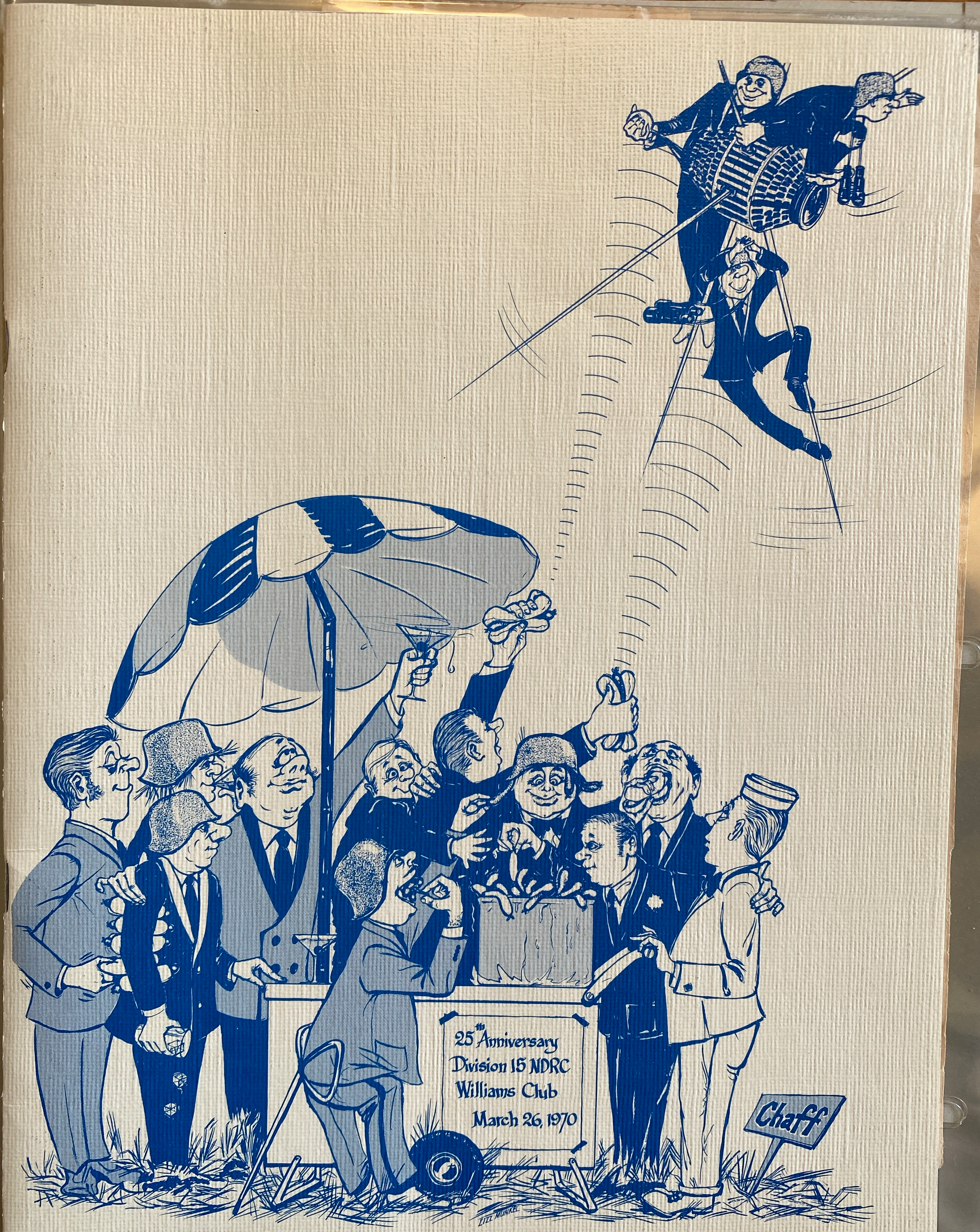
Our interest in the alumni of staff members who have left AIL prompts us to send a copy of this special issue to each former staff member who was employed at AIL for 10 years or more. It is our belief that they too are interested in our Anniversary because of the contribution they have made to it.

Because of the historical significance of this month's issue of the AIL RECORD, a limited number of extra copies were printed and are available (while they last) from the Personnel Department.

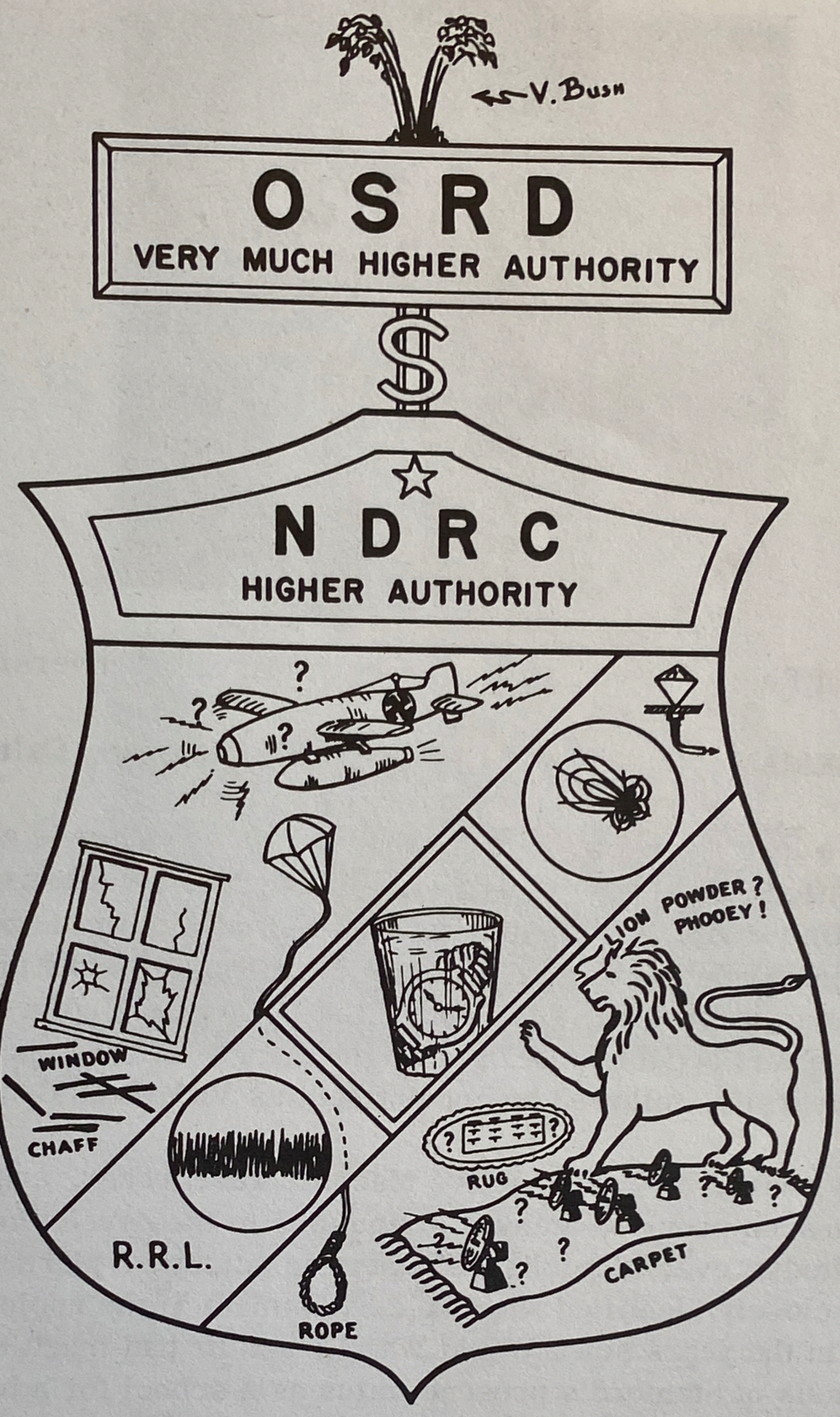
AIL a division of CUTLER-HAMMER

CONTROL

DEER PARK, LONG ISLAND, NEW YORK 11729



scientific and educational or-

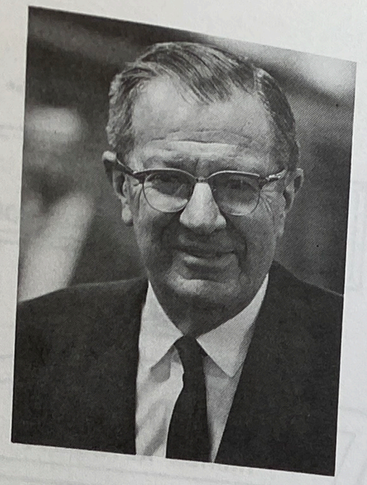


Dear Jammer:

Stories, resumes, biographies from Who's Who, etc. all came in as a result of our request for information which would be fit to print in this brochure. The biographies ran from 0 to 9 pages so we have taken liberties with all of them, using the period after the war as a starting point in most cases -- sometimes lengthening, usually shortening them, and even writing a few that never came in. Many of those who sent in their stories are unable to attend and they all send their regrets and best regards.

So -- to begin with, we beg your indulgence and hope that you enjoy our attempt to bring you up to date on this very special anniversary!!!!

Hal Albrecht and John Dyer



Director of Radio Research Laboratory at Harvard University - World War II

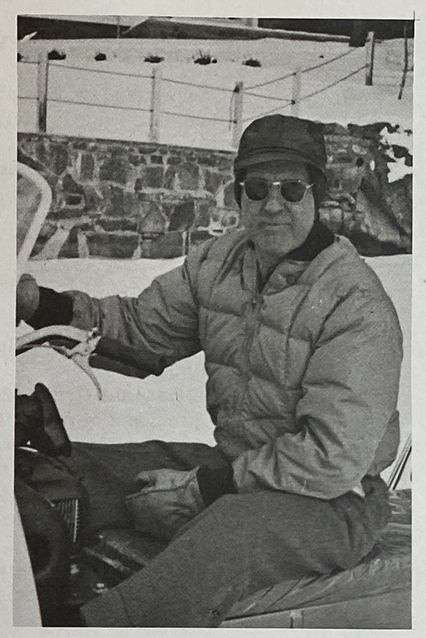
FRED TERMAN 445 El Escarpado, Stanford, California

Fred has a long record of distinguished service to science and engineering with several different and individually significant facets. After graduation from Stanford University, California, in 1920 and receipt of his Sc. D. degree from MIT, he joined the Stanford Electrical Engineering Department in 1925. In 1937, he was made Executive Head of the Electrical Engineering Department, and in 1945 was appointed Dean of Engineering. In 1955, he became Provost at the University, followed by appointment as Vice-President in 1959.

For many years, he was an active teacher, researcher, and author. His personal research provided many contributions to the development of electronics and resulted in over 50 published papers in scientific journals. Dr. Terman has been closely identified with the development of the engineering program at Stanford in the years since World War II, and he had much to do with establishing the basis of Stanford's present status as a school for advanced training in engineering.

He has served on various government groups, including the Naval Research Advisory Committee, the Defense Science Board, Board of Foreign Scholarships, and as consultant to the President's Science Advisory Committee. Dr. Terman was Vice President of the American Society for Engineering Education, and President of the Institute of Radio Engineers from whom he received the Medal of Honor and the Founders Award. He was also the first recipient of the Educational Medal of the American Institute of Electrical Engineers. In 1964, he received The Lamme Award from the American Society for Engineering Education "for his distinguished career as teacher and administrator, for his authorship of several of the most widely employed textbooks in the engineering profession, for his high standards of excellence in his own work and in that of his faculty, for his leadership in the development of his university and its surrounding technical community from comparative obscurity to genuine eminence, and for his generous service to the engineering societies and the federal government."

Since his retirement from Stanford in 1965, Fred has been as busy as ever. He traveled in Russia on a survey for the U. S. Office of Education in 1965. The Chinese Institute of Engineers sent him to Taiwan in 1968 to advise on education. State agencies have engaged him for in-depth surveys of engineering education in Ohio, Colorado, California and New York. He has even been a part-time Texan, serving as President of a foundation established to stimulate engineering and science at Southern Methodist University.



Head of Division 15 NDRC - World War II

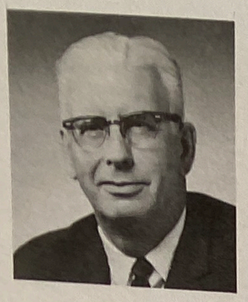
GUY SUITS, Crosswinds, Pilot Knob, N.Y.

We moved to Lake George in 1964, intending to be there mostly in the summer, with the winters in Schenectady. However, we hardly ever got back to Schenectady, and Pilot Knob, New York (on Lake George) has become our year round home.

This being something of a resort area, we have quite a number of visitors during the summer, but we do manage to squeeze in a little time for boating, swimming, skin diving, and operating the Cessna amphibian. In the winter we go south briefly, but we are at Lake George most of the time.

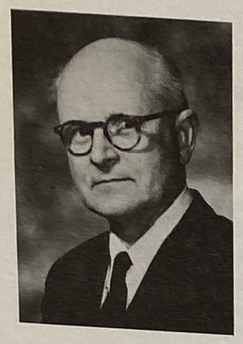
The present winter is turning out to be more of an arctic experience than usual. Last night the temperature dropped to -29 degrees F., and during the previous fifteen days the mean temperature on my recording thermometer has been -10 degrees F. With three-and-a-half feet of snow now on the ground, we think this may qualify as an "old fashioned" winter. The snowmobiling on the lake is fabulous.

I'm doing some consulting in research management, and have three fairly major tasks under way with companies that wish to establish or improve their corporate research. Having made all the possible mistakes in this area, I can give them quite good advice.



HAL ALBRECHT, 222 Broadway, New York, N.Y. 10038.

At the moment, I am winding up 39 years of Bell System service interrupted by such pleasant interludes as our Division 15 experience and 10 years in the military side of Bell System activities. I continue to be moderately peace loving, commute daily, and look forward to a day in the future when I can spend all of my time in a less disciplined environment.



ANDY ALFORD, 120 Cross Street, Winchester, Massachusetts.

Late in 1945 Andy formed the firm Andrew Alford, Consulting Engineers and in 1948 he became president of Alford Manufacturing Company. His activities included transmitting television antennas and direction finders for military and television use. In addition, Andy developed the wide aperture localizer system which has been widely used and he originated a VOR System using a cylindrical four slot antenna which is now widely used all over the world.

During the last twelve years he has devoted a good portion of his time in the field of instruments for RF measurements. He has served at various times on several IEEE Committees and has also served on the RTCA for over 25 years.

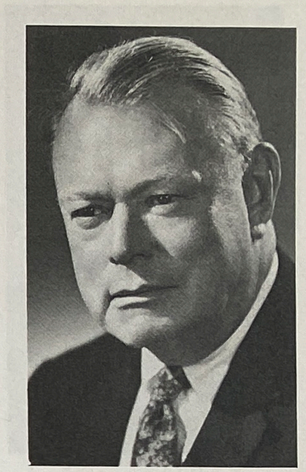
He has been a Fellow of the IEEE since 1942. In 1948, he was awarded the Presidential Certificate of Merit.

HAROLD H. BEVERAGE, P.O. Box BX, Stony Brook, N.Y.

Dr. Harold H. Beverage, a native of Maine, graduated from the University of Maine in 1915, and also received the Honorary degree of Doctor of Engineering in 1938. Dr. Beverage is known as the inventor of the "Beverage" Wave Antenna and as co-inventor with Dr. H.O. Peterson of space diversity reception. During World War II, he was a member of Division 15 and also traveled extensively overseas as a consultant to the Office of the Secretary of War, for which service he received the Signal Corps Certificate of Appreciation.

Dr. Beverage retired in 1968, at which time he was Director of Radio Research for RCA Laboratories, and also Vice President in Charge of Research & Development for RCA Communications, Inc. He is currently a consultant to RCA Laboratories.

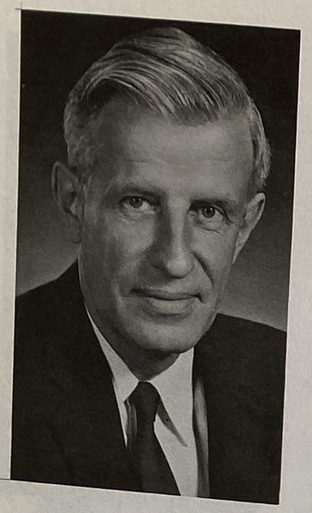
Dr. Beverage has received many honors and is listed in "Who's Who in America," "Leaders in American Science," and several other biographical directories. He is an Honorary Member of the U.S. National Committee of the International Union of Radio Science and of Tau Beta Pi, and an Eminent Member of Eta Kappa Nu.



K.C. BLACK, Scientific Analysis Corporation
97 Lincoln Road, Wayland, Massachusetts

Once upon a time, KCB in a fit of physical exuberance committed a cardinal sin of woodsmanship. After having cut down a number of trees he was guilty, when trying to split the logs into manageable firewood, of hammering the axes in the manner of wedges in spite of the lore to the contrary. Strange as it may seem, a rugged thing like an axe can be destroyed by this action and shortly after trying to do this I was faced with three axe heads which had been completely broken. Also in the process, I had, for other reasons, broken the handle of a small sledge hammer. Since I was a very busy man, I commissioned my wife to go to Sears Roebuck and buy me two axes, three-and-a-half pound heads; one axe, two-and-a-half pound head; and one small sledge hammer. Since she is very tractable she did so and the sales person turned out to be a lady of color from the heart of Boston. Without attempting to reproduce a dialect (which, I believe, is against government regulations in any case) the sales girl made a parting remark to Margot, "Will I remember this day, when a woman got three axes and a sledge hammer."

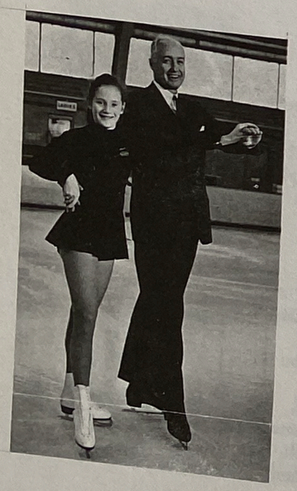
While working in Europe as Scientific Advisor to General Norstadt, then Commander of the Principle NATO Forces in Europe, I used to make frequent visits to various NATO countries to visit laboratories, discuss military - technical developments, etc. Prior to such visits it was customary to call the Ministry of Defense of the country and the details of the visit were usually arranged by them. Once, I had an urge to visit West Germany and I placed a call to the Ministry of Defense in Bonn. I received the word from the operator that there was "no answer", and upon further checking the Chief Operator said there still was no answer. The equivalent in this country would be to have called the Pentagon (Laird) and to find out that there was no answer. As I was walking along a corridor at SHAPE immediately after this strange message, I met a congenial German officer and I said to him, "I think your country has just been conquered". He said to me, "How can you say that?". So I told him of the unsuccessful telephone calls and after a moment of silence he said, "Ah, of course, it is the Monday of Faschung. Nobody is at work today nor will they be tomorrow and I would not recommend trying to call anybody on Wednesday (Ash Wednesday) because they will all have fearful headaches". It was then that I appreciated that the adjournment, the equivalent of Mardi Gras, can be very exciting and the year following I managed to visit Germany during this period and found it was as interesting as the German Colonel had implied. However, for those who want to invade Germany there is an obvious lesson to be learned from this story!



JOHN P. BLEWETT, Brookhaven National Laboratory
Upton, Long Island, N.Y.

After the war I continued at General Electric for a short time where I became interested in some new ideas for particle accelerators. When the Brookhaven Laboratory was formed in 1947 this seemed to me a fine idea and an opportunity to fulfill a long-held ambition to live on Long Island which, after ten years in Schenectady, looked to me like a sea-girt paradise. I have been at Brookhaven ever since and have had the satisfaction of watching it grow from nothing to a successful laboratory now staffed by over three thousand people. Our first success was the Cosmotron, a proton accelerator that was the first in the world to produce protons (or anything else) with an energy of over a billion electron volts. It reached three BeV. Then we had a bright new idea (alternating gradient focusing) which made it economically possible to build the AGS which works at 33 BEV. With it we held the world's record for seven years until, in 1967, the Russians surpassed us. So now we are dreaming of a 2000-BeV machine using superconducting magnets. All we need is more money.

N. PRESTON BREED, State Street Bank and Trust Company
Boston, Massachusetts



N. Preston Breed, the "Business Prevention Department" of RRL, the early day conglomerate that sponsored Florosa Field Station, ABL-15, etc. left Harvard and RRL with a much treasured joint Army-Navy Certificate of Appreciation. A State Street Bank Senior Vice Presidency and some directorships doesn't cut much mustard with the new technical company millionaires who will assemble for this reunion, but -

Who among you was a New England Figure Skating Champion?

Who has climbed the Matterhorn?

Was a Lieutenant in the real horse Cavalry?

Who has made a 185 yard hole-in-one in a tournament?

Who has made four dives in a submarine?

Landed on and taken off from a carrier deck at sea?

Been under 20 lb. of air pressure in tunnel construction under Boston harbor?

Won the Crane Bowl Greensomes?

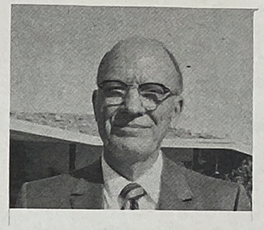
Who has played with Phil Rogers in the Avco Classic Pro-Am?

Who in January 1970 won the Mt. Tremblant Gold Medal for Slalom Competition?

In my fashion, I have LIVED!

lb. 4 ... Contemporary Art

... Bridgton Tuesday of this week. Lightning struck the barn at the property of Mr. and Mrs. Earl Rumery but the heavy rain ex-



JOHN BYRNE, 4451 E. Joshua Tree Lane, Paradise Valley, Arizona

John writes that this photograph was taken during the month of February at his home in Arizona -- on a beautiful day, a record 85 degrees, with unlimited visibility.

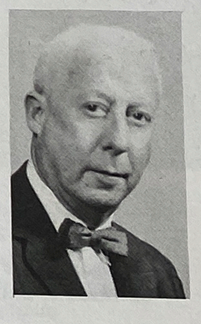
He goes on to say, "Yours truly has resigned from the military industrial complex as of 1 November, 1969, and now receives a monthly retirement check from Motorola. This at age 64, for if you can't cut it in 64 years, the 65th can't do a h--l of a lot more for you!

Future career has a number of options, for example: professional golfer, college teacher, college student, grandfather, home maintenance worker, highway communication and control systems designer, etc. Keeping pretty busy at it too. Reminds us of Sybil Terman's remark when Fred retired, 'Out of one full time job, and into three half time ones'.

Elaine and I are planning to live here in Phoenix for a few years at least, with perhaps a summer place near Portland, Oregon, where Blake, Mary Frances, and little John live.

Count us in on a word of appreciation to Guy Suits, Bob Larson, Harold Albrecht, and John Dyer for spearheading the continuing activity of the Division 15 Group.

And finally, the latchstring is always out to the gang. Give us a shout when you are in the great southwest!"

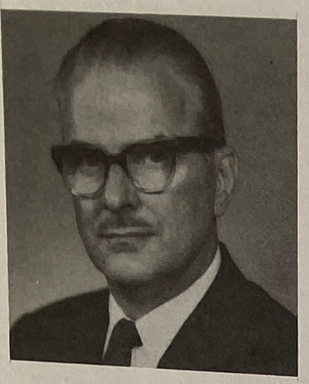


CLARK CAHILL Box 6, Centerport, Long Island, New York

I shall always treasure my continuous association for twenty-five years, (in some cases, almost thirty years) with a group of friends, outstanding technically and socially - all dedicated to our country's best interests. The Division 15 twenty-fifth anniversary attests to the lasting coherence and compatibility among individuals originally joined by a common and vital purpose.

In addition to five wartime years at RRL and ABL-15 of Division 15 (which included missions of varying lengths in the New Guinea area and in Europe), I have been with Airborne Instruments Laboratory (now the AIL Division of Cutler-Hammer, Inc.) for almost twenty-five years. These rewarding years have been made particularly memorable to me by my close association with the late Hector R. Skifter, a peerless leader of men.

On the personal side over the years, my family and I have engaged in many absorbing avocations. My wife, Ann, also owns and operates a small retail pet supply shop in Huntington, Long Island, which keeps her hopping. One son, now 22, has just received his degree in Archeology from the University of Pennsylvania and is about to start his own career; our younger son, almost 21, is married and has become a part of the "Wall Street" complex.

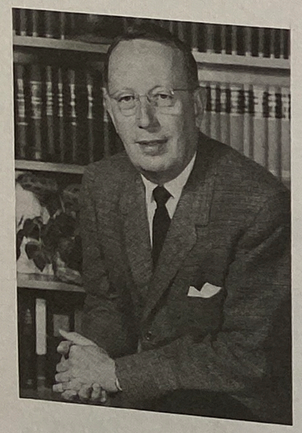


RALPH L. CLARK, 4307 North 39th Street, Arlington, Virginia

This fellow has knocked around the communications and related research and development activities of the U.S. for most of the last 40 years, spending the years since 1942 in countermeasures, intelligence related thereto, or telecommunications management activities intended to improve and enhance our overall telecommunications capabilities.

In his present assignment, he has been primarily concerned with international telecommunications matters ranging from NATO to INTELSAT.

He hopes to retire sometime within the next few years with enough energy left to write a bit about his experiences in these activities.



A. EARL CULLUM, JR.,

A. Earl Cullum, Jr. & Associates
Inwood Post Office, Dallas, Texas

A. Earl Cullum, Jr., Associate Director, Radio Research Laboratory, Harvard University, operating under contract with Division 15, National Defense Research Committee.

Immediately after World War II, I returned to my office in Dallas as head of a firm of Consulting Radio Engineers. We did considerable work for the original Joint Research & Development Board, being active both with the Electronics Committee and the Countermeasures Sub-Committee. Our consulting engineering work expanded to where we handle not only AM and FM radio, but television, microwave and general communications. We represent most of our clients on a year-in and year-out retainer arrangement. Our clients extend from Boston to San Diego and Seattle to Miami. We also do considerable work in Puerto Rico and Hawaii.

In recent years, I have been involved in many local civil activities, particularly in areas of education. Among these activities have been the following:

Member of the Board and Member of Executive Committee of Graduate Research Center (now University of Texas at Dallas).

Member of the Board and Executive Committee of SMU Institute of Technology (formerly SMU School of Engineering).

Member of the Board and Executive Committee of St. Mark's School of Texas (private preparatory school for boys).

Member of the Board and Executive Committee of The Hockaday School (private preparatory school for girls).

Member of the Board and Executive Committee of The Association for Graduate Education and Research in North Texas (TAGER). This organization has installed and maintained a multi-circuit microwave television system interconnecting seven private colleges and universities in the North Texas area. Some 1900 students have been enrolled taking graduate courses.

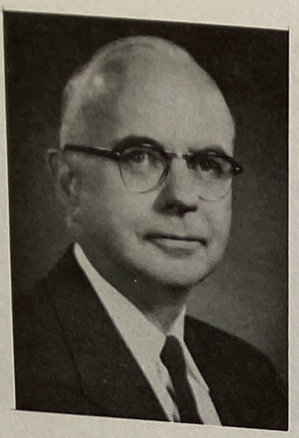
Member of the Board of the Dallas-Fort Worth Regional Airport. The airport is currently under construction and will be one of the largest airports in the world.

Member of the Planning Committee of the Goals for Dallas Program. In addition, I am Chairman of the Goals for Dallas Task Force on Higher Education.

Fellow, Institute of Electrical and Electronic Engineers.
Presidential Certificate of Merit.
Member of Dallas Citizens Council.

LARRY CUMMING, 1101 Beach Drive, Victoria, B.C., Canada

Larry Cumming's six pages of material required editing!! He included various press clippings and we are quoting the one from 1921 which was in the Portland Press Herald -- "Lawrence Cumming of Boston, a student at the Massachusetts Institute of Technology and one of the best known amateur radio operators in the Country, is installing special apparatus at his Prouts Neck radio station in order to receive messages from Donald MacMillan while he is in the North. Mr. Cumming has received messages from Holland, France, Germany, Switzerland, Mexico and Vancouver, besides all important stations in the United States." The clippings continue through WTAT, WNAC, WBZ-WBZA, the Boston Metropolitan Police Radio, and then there was a terrible gap (which may have hidden significance) up to the IRE-IEEE, and when he retired in 1965, his biography in the employee publication of the IEEE mentioned the fact that he retired from the Navy in 1947, that he married Adelaide in 1950 and that his future plans include consulting, Ham Radio, hunting, sailing and hiking.



BILL DOW, The University of Michigan, Space Physics Research Laboratory, Department of Electrical Engineering, Ann Arbor, Michigan

Let me begin at the end. On February 19, I returned from a world-circling journey, shared with me by Mrs. Katherine (lovely "Kitty") Dow, my wife since April 2, 1968. The mother of my two fine boys, Daniel and David, whom you remember as Edna Dow, hostess on various occasions to "Jammers" up on Belmont Hill, came to the end of her journey among us in 1963. Kitty had learned to speak Spanish fluently during four years (as a girl and young woman) in Puerto Rico, and is a Spanish teacher in Pioneer High School in Ann Arbor. Each summer, she takes a group of 35-40 high school students of Spanish for six weeks of school in Madrid and two weeks of touring Paris, London, the Costa del Sol, Granada, Cordoba, Seville. I go along for fun and to help.

The focus of our world travel, which began November 17, was for me to become familiar with the satellite launch provisions and the responsible engineering staff at the Italians' San Marcos Equatorial Range, some 90 miles north of the seaport of Mombasa on the Indian Ocean coast of Kenya in East Africa. They will measure directly the aerodynamic drag on the satellite; aeronomical instrumentation to measure attributes of the atmosphere that produce the drag is being provided by the Space Physics Research Lab of the Department of Electrical Engineering at our University, with funding coming from NASA.

The Space Physics Research Lab currently operates at about $1,500,000 annually; it has an extremely valuable educational function, as a great deal of the work is done by students - both undergraduate and graduate. When I started this on a small scale in 1946 by instrumenting captured German V-2 rockets for upper air research (under U. S. Air Force funding), I did not know that it would some day provide a fine consulting-type of part-time activity for me after retirement from educational responsibilities. My titles now are: Professor Emeritus, Past Chairman, and part-time Senior Research Geophysicist ("Outer Space").

On our world journey, we visited many of my former colleagues in education and in space work, as well as former students, who greatly enjoyed playing host to us in many parts of the Far East.

Because of my "space" work, I was a charter member of the Rocket and Satellite Research Panel that guided all the upper air research in the U. S., using spacecraft, from 1946 until NASA was formed in 1958; we had, I believe, considerable impact on the form taken by the legislation establishing NASA. The University of Michigan instrumented half of the 60 rockets launched from Ft. Churchill on Hudson Bay during the IGY, 1956-58.

Of course, I have been active in professional society committee work. In the University, I served on the Engineering Research Council, the Administrative Committee for the Aeronautical Research Center at Willow Run, the Executive Committee of the College of Engineering, and was elected by the faculty to serve on the 21-member Senate Advisory Committee for University Affairs. My primary research and teaching fields were in various phases of physical electronics (vacuum tubes, plasmas, electron optics, solid-state devices); in industrial electronics; and in system engineering as applied to "hard" systems; radar, power systems, space exploration, military electronic and space systems, etc.

I have collected various medals and awards - in particular,

Distinguished Alumni Achievement Award from the University of Minnesota, 1961;

Distinguished Faculty Achievement Award, at the University of Michigan, 1962;

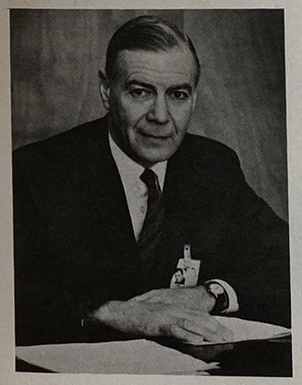
the 1963 Medal and Award in Electrical Engineering Education from The Institute of Electrical and Electronic Engineers (the best of the lot).

I was a Fellow of both the I.R.E. and the A.I.E.E. before their merger.

Let me close by stating what I believe to be the proper Mission of the Engineer: "The mission of the engineer is to accept major responsibilities in making maximum use of the resources of science to create value for humankind."

And I have a message for all who live long, as for example beyond the biblical three-score years and ten, as I have: "While one draws breath, life is to be lived to the full."

And so, in pursuit of this, I have married my beloved Kitty, and taken us both on an around-the-world experience to beautiful places, among fantastically interesting people, and free-roaming wild animals. What is next? I do not yet know; for now, a little quiet time.

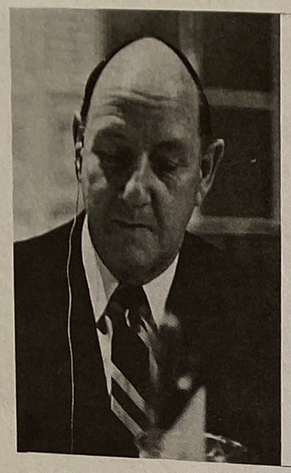


JOHN DYER — AIL, a division of Cutler-Hammer, Inc., Comac Road, Deer Park, L. I., N. Y. 11729

The members of the ancient and honorable Society of Division 15 who are still gainfully employed are becoming fewer and fewer. I am yet one of those; and in the words used by many a member over the past 25 years during the roll call - "I am still at" (AIL) "and in the same job as last year."

In these days of inflation, fixed price R&D contracts, and cuts in government spending, those of the Division 15 group that still are doing substantial business with the government look on the old days with much nostalgia.

As the years roll on, most of us find our community commitments increasing. This has happened to me also; and I have worked with the problems of race, schools, housing, poverty, youth, the church fund raising, and so on. These matters have kept Priscilla and me occupied almost to the limit of our spare time. In addition, for reasons of maintaining some semblance of sanity, I still dabble with photography, with and without a Questar (eclipse, birds, etc.), work frustrations out in the garden and by listening to music or singing in the choir, relax at Lake Winnepesaukee and in rebuilding a house in Center Sandwich, New Hampshire, and look longingly at many other pursuits put aside for now. All three daughters are married - and we survived! Grandma and Grandpappy have two fine grandsons. We now have to explain which war we are talking about when we say, "During the war, I . . . " Was it the Civil War?



DAVID FERRIER, 43 Cameron Drive, Huntington, New York

The photo was taken as I listened to a replay of Fred Terman's taping of his most recent call from W G H Finch - who is now retired. In some ways, I therefore continue functions of Division 15 days!

At the end of the war, I had no opportunity to remain in the cloistered security of the uniformed national defenders. I therefore eagerly joined the Military-Industrial complex and found ways to bring considerable monetary success to the three companies which gave me, in exchange, two weeks of paid vacation each of the 19 years I split amongst them. Coincidently, I found so much extrapolation of valid engineering being foisted on the unwary, that I managed to stay awake during over 30-course semesters in night graduate school; and, as a result, I believe I was able to sort out a few redundant equations.

Amateur radio (call W2GKZ - Amateur Extra Class), County and National Committee work in the Boy Scouts, and giving up of the smoking habit, proved to be worthwhile activities.

Vacations are now on a more reasonable basis. I am teaching (at least, temporarily) in the Electrical Technology Department of the State University of New York at Farmingdale.

Perhaps I should have accepted the chairmanship of the Confusion Committee of the Joint and Combined Chiefs of Staff, when it was offered.

BILL FINCH

Route 84, Newtown, Connecticut

Bill has the distinction of being one of Division 15's earliest IRE members (1916). Like many others in Division 15, Bill has lived an extremely active life. He started in the early days of radio studying at Marconi Institute. He studied radio engineering and patent law at Columbia University and was admitted to the bar. He became Assistant Chief Engineer of the FCC in 1929 and was Chief Engineer in the investigation of AT&T in 1934. He established the first radiotypewriter circuit from New York to Havana, was president of Finch Telecommunications and was a communications aide with the Wilkins Transarctic Submarine Expedition - the "Nautilus." Bill was the U. S. representative to international frequency allocation conferences. During his Navy career, he became a commander in 1941, captain in 1943, was in charge of RCM in the Bureau of Ships. When he retired from the Navy in 1957, he was Assistant Chief of Naval Reserve.

Bill holds 180 patents in facsimile and telecommunications. He is a Fellow of the IRE, AIEE, Radio Club of America. In 1969, he received the Wisdom Award (past recipients include Churchill, Eisenhower, Sarnoff). He was awarded the Legion of Merit Medal of the U. S. Department of the Navy in 1946.

Presently, Bill is developing advanced facsimile equipment at his laboratory in Richmond, Virginia. He is a consultant to the American Newspaper Publishing Association.

We suspect Bill prefers his 100 acres on Route 84 in Newtown, Connecticut, where he lives with his wife, Helen, in the summer.

WIN FROMM, Laurel Court, Lloyd Harbor, Long Island, N.Y.

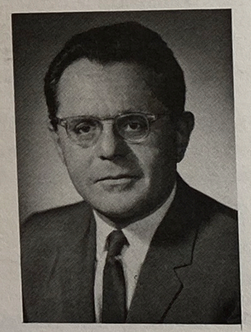
Win Fromm joined Columbia University's Airborne Instruments Laboratory in 1941 and remained with AIL when it became an independent laboratory in 1945. He is currently Executive Vice President of AIL, now a division of Cutler-Hammer.

He is a Fellow of the Institute of Electrical and Electronic Engineers, and Associate Fellow of the American Institute of Aeronautics and Astronautics and past chairman of its Long Island Section. He is also a member of the Visiting Committee of the College of Engineering of Drexel Institute of Technology.

Win resides in Lloyd Harbor, Long Island, with his wife Twanette, and their three children; Pamela, David, and Karen. He is a Village Trustee and Deputy Mayor of Lloyd Harbor.

He is also an amateur radio operator -- Station W2GPR is back in operation. However, his favorite hobby is cruising Long Island and New England waters in a yawl or ketch, and despite the fact that he sold his Seabreeze 35 last fall, he does not intend to give up the pleasures of cruising at sea.

GENE FUBINI, 57 Pepper Lane, New Canaan, Connecticut



Since Gene left AIL in 1961 (after 16 years) to join the Department of Defense, he has continued to lead a very interesting and exciting life. He spent a total of four years in the DOD as Deputy Director of Defense Research and Engineering for Reasearch & Information Systems, and as an Assistant Secretary of Defense. While in the latter position, his responsibilities encompassed management of the entire field of military research and development programs, the supervision of the National Security Agency, and the review of the programming of all command control and communications items for the DOD.

Gene resigned from the DOD in 1965 and joined IBM as a vice President. He was promoted to the position of vice president and group executive in 1966, and was responsible for IBM's Research Division, Advanced Systems Development Division, Science Research Associates, Inc., the Production Systems Department and the Instructional Systems Development Department.

In April 1969, Gene resigned from IBM to become a private consultant to both industry and the government, with offices in New Canaan, Connecticut and Washington, D. C.

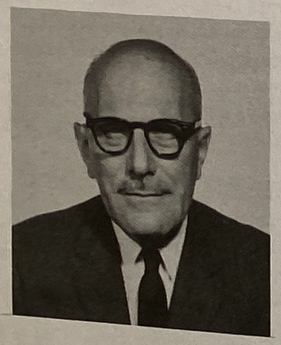
Gene is a fellow of the IEEE, has authored about 30 technical publications and holds 11 patents. He has been, and still is, very active as a member of many governmental advisory groups and committees. He has received the Presidential Certificate of Merit and the Defense Medal for Distinguished Public Service.

Gene and Betty and five of their six children live in New Canaan. One daughter married last fall and she and her husband reside in Michigan. She is finishing her studies at the University of Michigan and plans to become a veterinarian along with her husband, who recently graduated and is working as a vet. Their oldest daughter spent two years in the Peace Corps in Korea and is now back home with them. In his "spare" time, Gene still enjoys hiking and skiing with his family.

KENNETH M. GENTRY, Captain USN (Ret), 3751 Foster Street, Evanston, Ill.

1956 - 57	Commanding officer, heavy cruiser ROCHESTER, Flagship 7th Fleet, Far East.
1957 - 58	Asst. Chief of Naval Operations (R&D)
1958 - 59	Planning for, and establishment of, SACLANT ASN Research Center, La Spezia, Italy.
1959 - 60	SACLANT Deputy (Military Director), SACLANT Center
1960	Retired 30 June, after 34 years naval service (counting USNA)
1960 - 64	Asst. Director, R&D (Hydrospace), Military Division, Motorola
1964 - 66	Executive Consultant, Cadillac Association, Inc.
1966 - 70	Hydrospace Consultant and Lecturer
1966	Project Director, Water Quality Study in Lake Michigan, conducted by Northbrook, Illinois Company
1967 - 68	Consultant to IIT Research Institute, Chicago, for project to establish a water research center on Lake Michigan.
1970	Currently taking a correspondence course in automobile accident investigation and adjustment with the object of establishing an office in this field.

Senior Member, IEEE
Foundation Member, MTS
Member Board of Directors, Navy League Chicago Council
Chairman, NSIA ASW Committee (Fixed Systems) 1960 - 63
Chairman, Great Lakes Section, MTS 1967 - 68



GEORGE W. GILMAN, The MITRE Corporation, Communications Division, Bedford, Massachusetts

Degrees:

BS - MIT, 1923

Background:

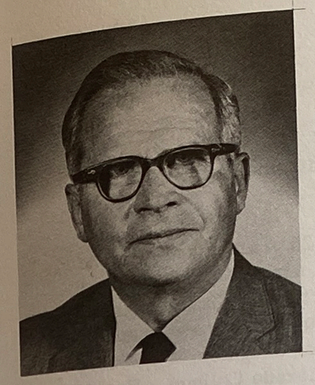
Transmission Engineer, New England Telephone & Telegraph Company, and American Telephone & Telegraph Company.
Technical Representative in Far East and in Europe, AT&T Company and Bell Telephone Laboratories.
Consultant, Division 14, N.D.R.C.
Member, Division 15, N.D.R.C.
Director, Systems Engineering, Bell Telephone Laboratories, Inc.
Lecturer in Systems Engineering, MIT.
Executive Director, Data and PBX Division, Bell Telephone Laboratories, Inc.

Publications:

"Systems Engineering in Bell Telephone Laboratories," Bell Laboratories Record.
"A Transatlantic Submarine Telephone Cable," (with M. J. Kelly and Sir Gordon Radley (AIEE and British IEE).
Twelve patents in radio and wire transmission and signaling.

Affiliations:

Fellow, Institute of Electrical and Electronic Engineers.
Member, Association for Computing Machinery.
Member, Cornell Club of New York.



PETER GOLDMARK — CBS Laboratories, High Ridge Road, Stamford, Connecticut

At the present time, Peter is President and Director of Research at CBS Laboratories.

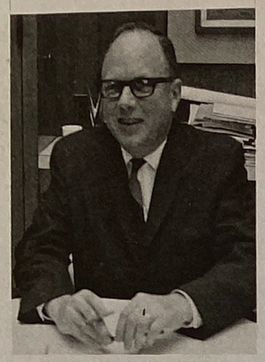
A summary of his many awards: Morris Liebman Prize, Vladimire K. Zworykin Television Prize, Achievement Award - IEEE's Professional Group on Audio, National Urban Service Award, George Washington Award, Elliott Cresson Medal, David Sarnoff Medal, Broadcast Pioneers Award.

Peter has directly participated in, and had the major responsibility for, the development of field sequential color television, which carried the world's first successful color television broadcast on September 4, 1940 from New York City. The same system, shrunk by modern technology, was used by American astronauts to beam live color pictures to world audiences during the flights of Apollo 10, 11 and 12.

He is responsible for the development in 1948 of the long-playing record. This extension of the then-known phonograph record art was due largely to his active participation and major role in the experimental and developmental work needed to achieve high quality records carrying the major part of symphonic and classical compositions without interruption, an achievement having a major impact on the phonograph and recording industry, and which has brought cultural and entertainment enrichment to millions throughout the world.

Peter has been active in advancing technology for extreme high-resolution readout of photographic imagery, and is responsible for the development of the readout and ground recording system used in the U. S. Lunar Orbiter Program. The system proposed by Peter was used in each of five Lunar Orbiter spacecraft missions and enabled NASA to achieve the highest resolution ever recorded in the radio transmission of photographs through space.

A recent technological advance, spearheaded by Peter and destined to play an important part in the establishment of a new educational art form, is Electronic Video Recording (EVR). EVR, the video counterpart of the long-playing record, represents a significant step in the application of television to education by making it possible for the first time to show on conventional television sets, in the home or classroom, prerecorded programming from motion picture film and video tape at low cost. The EVR system combines optics and electron physics to transfer any film or video taped programming to a special unperforated thin film (or optical tape) stored in a small cartridge.



JOHN GRANGER, Granger Associates, 1601 California Avenue,
Palo Alto, California

"Somebody's arithmetic is bad. I haven't put in 25 years since ABL, no matter what the others may claim. I have put in some exciting ones, at Stanford Research Institute and with my own enterprise, Granger Associates. My most successful products - the result of a joint venture with another ABL alumna, Kay Mumford - are a schoolteacher daughter, a pre-med son, and a second son who is majoring in skiing at Colorado College. For this year, I'm celebrating it all with a stint as president of the IEEE."

GEORGE L. HALLER
Summer home: Hound Ears Club, Blowing Rock, North Carolina
Winter home: 1500 Galleon Drive, Naples, Florida

"I am afraid I will miss the gathering of the clan this year. I would like to be with you and swap some fresh lies, but in my declining years I don't believe I could stand all the fun in "Fun City" even though all this golf and sun is getting boring."

Born, Pittsburgh, Pa. 1907
Graduated, Mercersburg Academy 1924, Pa. State University, B. S. in E. E., 1927, M. S. in Physics 1935, Ph.D in Physics 1942; U. S. Army 1942-45, Colonel; College of Chemistry and Physics, Pa. State University, 1945-54, Dean; General Electric Co., 1954-67, Vice President, now retired; Honorary LL.D. Syracuse University, LH.D. Susquehana University, D.SC. Stetson University; Presently Board of Directors, Western Union Computer Utilities Corp., Carolina Caribbean Corp., and Geonics Ltd; Amateur Radio W4BQ.

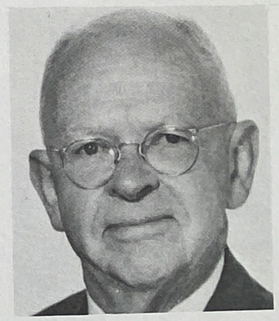
HIRAM D. HARRIS Box 102, R.D. 1, Rensselaer, New York

Am now Professor Emeritus of Electrical Engineering with 41 years of teaching at Rensselaer Polytechnic Institute behind me. Member of Sigma Xi and IEEE. As a member of ASEE, I have attended annual meetings at a variety of campuses, none more glamorous than the Air Force Academy at Colorado Springs. From there, drove on to visit Mesa Verde National Park and Santa Fé.

I operate a ham radio station (call W2CDC). Belong to ARRL. Am a registered New York State Professional Engineer and on occasion serve as a consultant to a local radio station.

My wife and I spend about four months of the year on Cape Cod. We have a home in the National Seashore at Eastham. Until the Job Corps Headquarters at nearby Wellfleet was closed, we were both volunteers there, helping the boys with arithmetic and English problems. We have become "lawn bowling" fans and are members of the Chatham Bowling Club. We also play recorders (vertical flutes) and are members of the American Recorder Society.

ROGER W. HICKMAN 514 Vista Hermosa Drive, Ojai, California

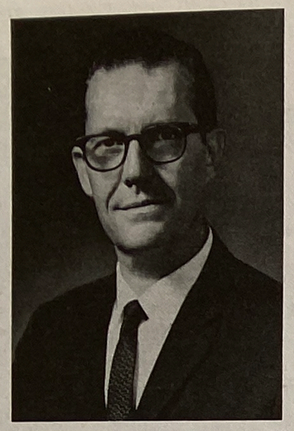


On July 1, 1966, I retired from Harvard. We disposed of our property in Belmont; and my wife and I drove to California, spent a few months in Laguna Beach, California, then purchased an acre of ground in a sightly location in Ojai. I designed and oversaw the construction of a modest house into which we moved in June of 1967. Since that time, I have become more of a horticulturist than a physicist, and am enjoying it.

In early November 1968, following a bit of necessary surgery, I suffered a cardiac arrest and was entrusted to the care of a mechanical device which then proceeded to break one or more ribs loose from my sternum, and used them to massage my heart. The device was successful in establishing the necessary rythmic beating and in due time I recovered sufficiently so that the cardiologist approved our taking a three-month round-the-world trip.

About twenty miles outside of Tashkent Uzbekistan, I visited one of the USSR nuclear installations and can report that they answered freely all the questions which I had sense enough to ask. There they had a nuclear reactor, a synchro-cyclotron and an electrostatic generator. The assistant to the director spoke perfect English; and when I left the wife of the director presented me with a big bouquet of roses to take back to my wife in the hotel in Tashkent!

Near, in Novosibirsk, in central Siberia on the Ob River, I visited a five-million volume library, more automated than anything I had ever seen in this country. To try out the system, I suggested that I would like to see a certain bound volume of the Review of Scientific Instruments. They put it in my hands within five minutes!! Needless to say, we were much impressed with Russia, particularly Siberia.



MEL JACKSON 285 South Compo Road, Westport, Connecticut

Mel left the Air Force early in 1946 a Lieutenant Colonel, decorated with the Legion of Merit for his part in planning and managing electronic countermeasures programs during his four years of service. He joined Airborne Instruments Laboratory at that time as Patent Engineer, working with John Byrne, V.P. Engineering. As proposal and contract activities picked up Mel picked up responsibility for them, what with John not wanting anything to do with the paperwork anyway. At the end of three years as Patent Engineer Mel established the Contract Office (and those J-numbers for identifying proposals) and was Manager through 1954.

Leaving Garden City, Long Island, with Molly and three sons, he moved to Westport, Connecticut, where the family still resides, two blocks from the Sound. The next seven years were spent as Vice President for Marketing at CGS Laboratories, which became Trak Electronics Company and, most recently, Wiltek. It was early in this period, while selling reconnaissance receivers and jamming transmitters, that Mel conceived and organized the Association of Old Crows, the name derived from the WWII ECM code name Raven, and designed and had minted the first Old Crow Coins. The dies for those were later made available to the present nationally organized and flourishing Association.

Mel's boating interests were revived beginning in 1958 with a 14-foot outboard skiff, followed by an 18-foot cruiser that the family trailed to Cape Cod in 1960 and to Penobscot Bay in Maine the following summer. During the first year as Manager of the Procurement Department of Perkin-Elmer's Electro-Optical Division in 1962, Mel's outstanding achievement was his procurement of a lovely old 1931 Alden yawl, 40 feet including bowsprit and boomkin, that he and son Dick, then 15, sailed home from Gloucester. This has been followed by fiberglass sloops, a Columbia 26 "Molly J," an Alberg 30 "Shahntih," a 29-foot Triton "Stardust," and the use of a 41-foot Bounty II for two seasons before the last boat.

At the time that relaxation of security restrictions surrounding the Army's night vision activities could be foreseen in 1968, Mel went with Raytheon's Machlett Laboratories in Stamford, where he continues as Product Manager, Light Image Tubes. In 1968, Machlett was the largest manufacturer of image intensifier tubes for Starlight Scopes and other instruments to operate in low light level starlight conditions. With declassification of many intensifiers and decreased prices, there are more and more commercial applications in low light level TV systems and LLL film cameras, as well as in directly viewed devices. Mel's principal interest these days is in those areas, aside from cruising-racing at Cedar Point Yacht Club.

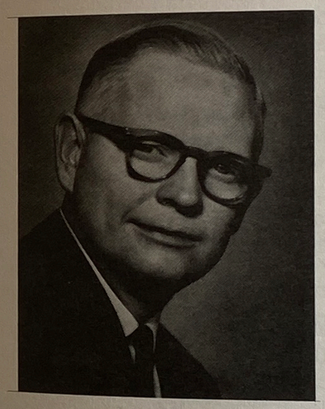
Molly and the boys, now 23, 20 and 16, are ardent sailors too. Molly still recalls with great pleasure her first secretarial job with Fred Terman at Radio Research Laboratory, where she and Mel met.

HERB JOHNSON, Norway Hill, Hancock, New Hampshire

Following the frequently hectic days at the Division 15 New York City office, we found much satisfaction in return to the growth problems of the public utility plant expansion as experienced by the New England Electric System.

This activity led on to the excitement and challenges of participation in the largely pioneering project of building and establishing successful operation of New England's first nuclear power plant - Yankee Atomic Electric.

And so, on to a somewhat belated entry to the "golden age" and more recently to the ranks of the "great silent majority" with modest involvement in the affairs of a small but active New Hampshire town.



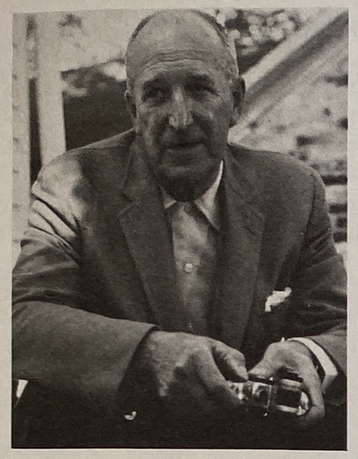
JOE KEARNEY, Lloyd Harbor, Huntington, Long Island, New York

Joe, who spent the wartime years at RRL, joined AIL, now a division of Cutler-Hammer, in January 1946, and has remained there ever since. He is now a Vice President of AIL. Throughout his years there, he has continued to devote a substantial portion of his career to electronic warfare.

Joe has been very active in IEEE affairs, and is a Past Chairman of its Long Island Section. In 1964, he was elected a Fellow of IEEE "for contributions to electronic reconnaissance systems." He is also a charter member of the Association of Old Crows and served as the first president of its Tri-State (metropolitan New York) Chapter.

At long last, Joe deserted the ranks of bachelorhood and was married in 1968. He became stepfather of a teenage boy, now 16, and a young lady now in training to become an airline stewardess.

The Kearneys make their home in Lloyd Harbor on Long Island's north shore.

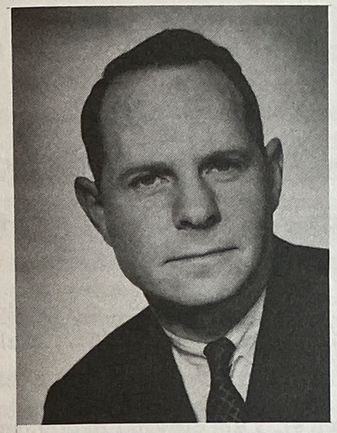


BOB LARSON, South Pomfret, Vermont

In June 1965, I retired from the GE Research Laboratory. In 1965, I did consulting work for the GE Research Lab; from 1966 to 1968, was full-time Director of the NY State Technical Services Program in Albany, New York; 1968-9, did consulting work part time for the NY State Science and Technology Foundation, Albany; 1969, consulting with the GE Research and Development Center, Schenectady for several months; 1970, occasional consulting with the New York State Science and Technology Foundation.

I am living with my wife, Elizabeth, in our new house in Pomfret, Vermont, which is about five miles north of Woodstock, Vermont and fifteen miles west of Dartmouth College. We have eight acres - no attic, no cellar, no lawn, no garden - lots of trees, small shop. Our daughter lives in South Woodstock about ten miles south.

For recreation, we indulge in some downhill skiing. There are two ski developments within three miles, and innumerable others within relatively few miles. Some of our neighbors with large land holdings have developed beautiful woods trails for cross-country skiing; no skimobiles allowed. Golf at the Woodstock Country Club - eighteen holes. Course crosses the creek twelve times, and the ball retriever is the most important club in the bag. Scores (mine) vary from 83 to 99, depending on the number of creek shots involved. Occasionally, we like to go to New Harbor, Maine, for a change of scenery. We do some color slide photography on a strictly amateur basis; and this area is littered with photographers, especially in October.



MATT LEBENBAUM 80 Whitehall Boulevard, Garden City, L. I., N. Y.

It is difficult to write a gripping saga of an adventurous life when, since the war, I have worked for only one company and have been doing the same sort of thing I did during the war. When I joined RRL in 1942, I was assigned to the receiver group under Don Sinclair; when I worked for the RAF at TRE I was in the receiver group in House 7; when I returned to England with ABL 15, I was head of the receiver group; and when I first came to AIL in 1945, I was Assistant Supervising Engineer of the Receiver Section under Joe Pettit. Incidentally, when I left ABL 15 to come back to the U. S. in 1945, I told John Dyer, with whom I had roomed at the Foley Arms for almost six months, that I would like to work for him after the war if he had a job for me. He did - and I'm still with him! Although the names have changed since then, and I am now Director of the Applied Electronics Division, we are still just a receiver group.

I must admit that one would not recognize most of the equipment if one were to awake from a twenty-five-year-long sleep and walk into the Lab today: parametric amplifiers, cooled to 20 degrees K, masers using a piece of ruby at 4 degrees K as the amplifying element, and all of the multitude of solid state components that go to make up a modern receiving system are certainly a far cry from the APR-1, Bagful and Elephant. But, at heart, most of us still use the same basic principles that we were taught in school, and it is hard to find a replacement for the tried and true superheterodyne. We recently received a contract to build the space-borne and ground receivers for a communications experiment to be performed aboard the Advanced Technology Satellites F and G. This is to prove the feasibility of a communications link at 10.6 microns and our group is building this far-infrared communications receiver - space qualified - using a laser for a local oscillator, a bulk semiconductor at about 100 degrees K as a mixer. And still one of the tough problems is to match the output impedance of the mixer to the IF amplifier! So, all is different and yet all is the same. Even to the cast of characters, for there are still many of the Division 15 people here at AIL.

From a personal standpoint, both of the kids have grown up and have gone away and left us with a big house and a dog. Pete graduated from Middlebury and, after Peace Corps service in Africa, is in the Neighborhood Youth Corps in Northern Vermont. Joan graduated from Ripon and, like so many other recent graduates, has gone to make the scene in Boston. She lives on the fourth floor of a walkup on the back side of Beacon Hill within ten minutes walk of her job at the Massachusetts Eye and Ear Infirmary. So, we use them as an excuse to go skiing in Vermont in the winter, hiking in the White Mountains in the summer, and manage to sneak away on our own, occasionally.

FRANK D. LEWIS, 15 Woodland Road, Lexington, Massachusetts

Stealing thunder from Honorable original author of line, "Same wife - new job." (Apologies to K. C. Black.)

Retired from General Radio Co. on December 31, 1969; currently spending working hours at James Millen Manufacturing Company, Inc., Malden, Mass., as electronics and radio engineer.

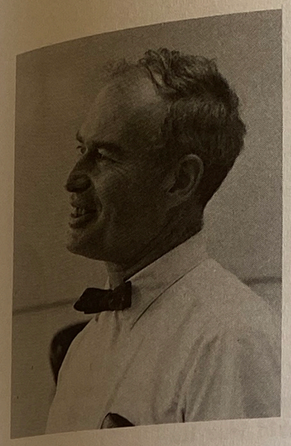
In my spare time (and a little of Millen's), I am engaged in competition with National Bureau of Standards on their own ground. With the aid, encouragement, and cooperation of Jack DeWitt (former president of WSM) and Jack Montgomery (engineer-in-charge, WSM-AM transmitter), we put WSM on 650,000 Hz (Hz = one cycle per second Atomic Time) to plus or minus 2×10^{-10} or better. Of course, a little help was received from Fritz Reder of USASRDL, Ft. Monmouth, who loaned a rubidium-cell standard to stabilize things. Phase records were made at G. R. Co., Bolton, Massachusetts and at Harvard by Jack Pierce. Also some were made at NRL, and hopefully one or two other locations. The general performance has been approximately $\pm 2 \times 10^{-11}$. Experiment will continue, although temporarily without benefit of local atomic standard. Object is to show that standard frequencies can be disseminated successfully by stabilizing clear-channel AM stations. Incidentally, this seems to pose a knotty problem in relations between government and private enterprise.

Aside from occasional sudden dashes to Nashville, my spare time is mainly devoted to Boy Scouting. I am now Assistant Scoutmaster of Troop 159, Lexington, Massachusetts of the Minuteman Council (I was the Scoutmaster for the better part of three years). The present Scoutmaster is going to direct the Parker Mountain Scout Reservation during summer camping period, and it looks as if I shall be Scoutmaster again for a while.

My family consists of: one daughter (Patricia) in Elmira College, Elmira, NY; one son (Robert) who is a senior at Lexington High School; one son (Peter) who is a junior at L.H.S.; and one most wonderful wife (Beatrice) who was once a Wave in the Navy in Washington. Son Robert hopes (or expects?) to enter "the college of his choice" next fall, to study physical sciences and engineering (obviously he has learned little by observing my example). Son Peter has achieved 8th place standing, so far, in the state-wide math prize competition sponsored by Actuaries Club of Boston. There are 6500 students competing.

Sometimes, people are judged not by their accomplishments but by the cars they choose. Mine are a 1966 Triumph 2000 sedan and a 1967 Checker Marathon station wagon. Guess which one goes on Scouting weekends?

Occasionally, I burst forth in other activities such as IEEE, where I currently serve on the Admission and Advancement Committee at IEEE HQ, and also in CCIR as a member of Study Group VII (Time and Frequency).

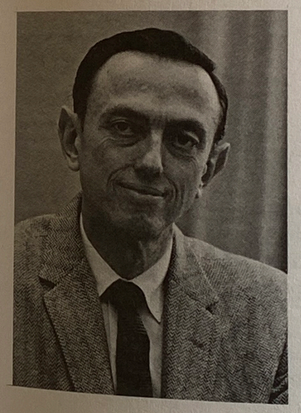


GORDON McCOUCH General Radio Company, Bolton, Massachusetts

Following WW II, twelve years at Aircraft Radio Corporation in the wilds of northern New Jersey included acquisition of my wife, Bettye, production of three daughters, and innumerable hours spent on IRE and School Board affairs. In 1957, we moved to Concord, Massachusetts, where the invigorating atmosphere led to production of a male heir, employment by General Radio, more IRE and (ugh!) IEEE activities, appointment to the town Finance Committee, and enjoyment of various hobbies including the cutting of two-foot planks with a non-patented chain saw rig operating in our back yard.

The world is obviously going from bad to worse, but human resiliency is such that in spite of it all, hope springs eternal. Day-to-day preoccupations with small matters with which one can cope with some measure of success loom larger than I like to admit. Individual successes and failures seem less important with the passage of years as I see the price so often exacted to achieve the former, and the gain in perspective from the latter.

The crystal ball sure is clouded by all the spectral pollution. I foresee occasional rain, sleet, hale and tornadoes mixed with sporadic sunshine at The Annual Division's reunions.

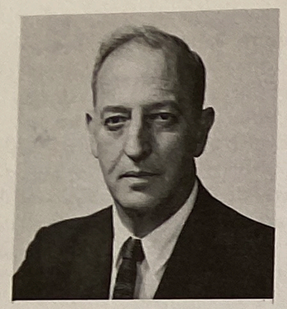


JOE PETTIT Stanford University, School of Engineering, Stanford, Calif.

On this twenty-fifth anniversary of the completion of the work of Division 15, I wonder that we have felt it rewarding to keep in touch over these years, and that we think those days are worthy of noting this long afterwards. It was, after all, a short span of time during which we worked together, and yet I expect we all do remember quite vividly the various matters that concerned us then. I recall quite clearly joining the group concerned with radar intercept receivers at the Radio Research Laboratory in May of 1942, eventually succeeding Donald Sinclair as director of the group. As a recent Ph.D. in Engineering, it was a real milestone for me in 1943 to take the laboratory model of the AN/APR-1 to Chicago for manufacture at the Galvin Company (now Motorola), then a few months later to take the Air Force version, the AN/APR-4 to Crosley in Cincinnati. It was exciting indeed to go with the first Crosley receivers to India with the 20th Bomber Command, and be there when the first intercept data came back from the Japanese mainland, showing that they were not using the advanced German radars at that time. Certainly, a high point came in early 1945 when I went to England as Associate Technical Director of ABL-15 under John Dyer, to be in Verdun on the day the Remagen Bridge was crossed, and then to be in London on VE Day.

The return to Cambridge in the summer of 1945 found me as an assistant to John Byrne, and then my following him to Long Island for the first year of AIL, Inc. My subsequent years on the Stanford faculty since January 1947, and particularly my years as successor to Fred Terman in the job of Dean of the School of Engineering has seen many world changes.

At a university, one is obligated to try and understand this crazy world as it looks through the eyes of students; and to them, it would seem strange indeed that anything so remote in history as World War II should have any relevance to us today. We of Division 15 know it does, and the human values which have bound us together because of World War II are the same values which are still important today. My greetings to you all.



LAVERNE PHILPOTT, 1 McElwain Street, Merrimack, New Hampshire

Laverne has been with Sanders Associates, Nashua, New Hampshire since 1967 and is Director of that facility.

Prior to that, he was with the Matrix Research & Development Corp., and the Defense Systems Dept. of General Electric Co., Syracuse, New York.

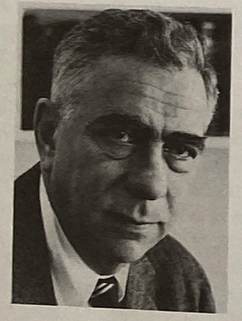
Some of his many accomplishments include the design of a lightweight, portable radio antenna; the design of a rotary transformer for space applications; and the design of an electronic liquid level detector for the steel casting industry.

In June 1945, he received an Honorary Doctor of Science degree from the College of Idaho for contributions to the development of radar, and work in electronic countermeasures and IFF, during World War II.

Laverne has been a senior member of the IEEE since 1947 and holds a Professional Engineer's license in the states of New York and New Jersey.

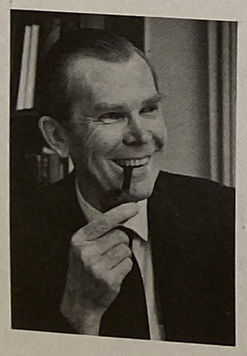
He is the recipient of the Distinguished Civilian Service Award, the Navy's highest award to civilians.

Laverne and his wife have one daughter and three grandchildren.



MANNY PIORE, Old Orchard Road, Armonk, New York

Manny Piore is Vice President and Chief Scientist and a Director of International Business Machines Corp. In Washington, he is a member of the National Science Board and he spends some time with the National Academy of Sciences and the National Academy of Engineering.

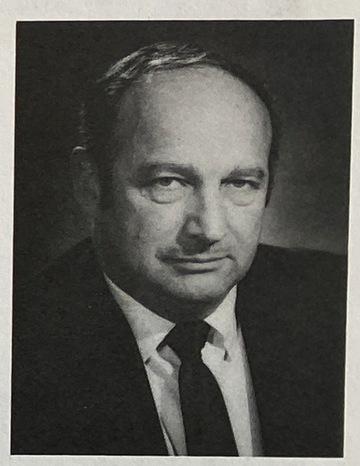


BILL RAMBO, Stanford Electronics Laboratories
Stanford, California

The smiling picture belies the troubled life of the university professor -- at least as experienced at Stanford, in electrical engineering, and with some continuing research contact with countermeasures. You may know that Terman, Villard, and Rambo are the most notorious local members of the military-industry-university complex. Last year, several hundred students disported themselves in a nine-day sit-in in one of our buildings to protest our activities (and the War, the Draft, Freshman English, and the local prohibition on Free Love).

All of this came about quite innocently. Following the RRL close-down, Edie and I joined AIL and experienced five enjoyable and instructive years. Family circumstances returned us to California where I enlisted at Stanford, again under Dr. Terman. We live on the Campus with our two girls. In due course, I have become Professor of Electrical Engineering and Director of the department-affiliated research laboratories. I also report to Joe Pettit as his Associate Dean of Engineering for Research. A conventional but stimulating career has eroded somewhat in the caustic atmosphere of administration. But there are still flashes of productivity, here and through association in Washington, and there is no end of excitement.

GEORGE RAPPAPORT, Scope Incorporated
1860 Michael Faraday Drive, Reston, Virginia

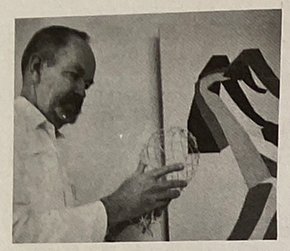


Dr. George Rappaport, currently Vice President, Corporate Staff, SCOPE Incorporated, Reston, Virginia.

During World War II worked very closely with Division 15 of the NDRC, both at Division level, Radio Research Laboratory and various contractors such as the Bell Telephone Laboratories. As civilian in charge of the Electronic Warfare Group at the office of the Chief Signal Officer, collaborated with the U.S. Navy in the initial establishment of the Radio Research Laboratory.

Especially enjoyed and took great personal satisfaction in working with the Radio Research Laboratory to transform developmental equipments into production units suitable for installation in U.S. Air Force aircraft and Signal Corps installations. After the war, transferred to Wright Field from Washington D.C. and served more than ten years as Chief Scientist for Electronic Warfare. Left the U.S.A.F. in 1956 and joined Emerson Radio and Phonograph Corporation as Vice President, Government Electronics Division.

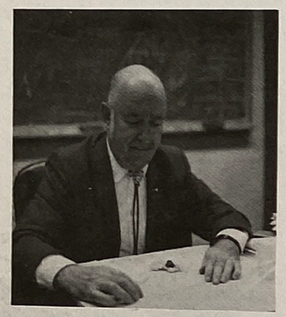
In 1962, was elected President of Warnecke Electron Tubes, Inc. in Des Plaines, Illinois, and fathered the creation of this new firm, an offspring of CSF, Paris, France. In late 1964, left Warnecke and joined SCOPE Inc., where activities include electronic warfare.



DICK RAYMOND, 535 East 86th Street, New York, N.Y.

If I had been told twenty five or even ten years ago that I'd be sitting around an apartment in New York designing paintings, sculptures and poems with the help of a computer I would never see*, I would have considered it improbable to say the least. But I've been doing all these things (and an occasional task for the boss when time permits), for a couple of years now. It isn't important but it is great fun. So far, it's only hard edge abstractions and "beat" verse, but in another ten years computer power should be cheap enough to handle the old masters. Does anyone have a good, cheap terminal? This model 33 TTY is beating my brains out.

* Naturally, I've never seen the computer, it's in Cleveland I think.



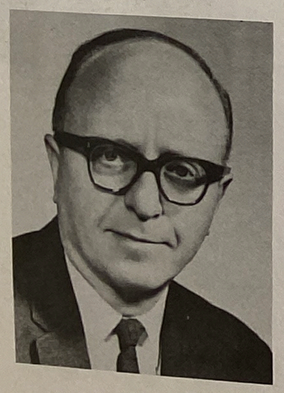
WINFIELD W. SALISBURY, Harvard College Observatory
Cambridge, Massachusetts

I am on the eve of taking off to Mexico for scientific observation of the solar eclipse of March 7, 1970.

I am enclosing a picture with a small piece of the moon on my desk, just as I predicted in an IRE talk in November 1949. I said then, "I expect to have a piece of the moon on my desk within the next twenty years." I made the deadline with one month to spare.

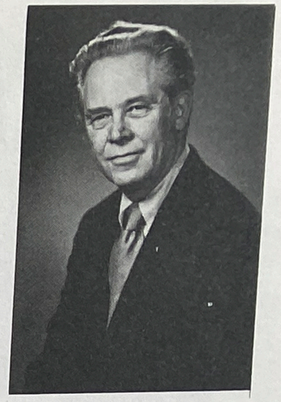
I am working as a physical astronomer with a joint appointment at Harvard College Observatory and Smithsonian Astrophysical Observatory. I am working on radio determinations of lunar structure and the production of chondrules similar to those found in stony meteorites by means of lightning-like discharges in dust clouds. I have a new project starting to measure the velocity of gravity.

So you see I am still having an exciting life. I do not expect to retire for many years yet, in spite of my calendar age.



BERNIE SALZBERG, Ridge Rock Road, East Norwich, Long Island, N.Y.

Bernie Salzberg who was at NRL from the Spring of 1941 to the Fall of 1956, (and at RCA before then) has been at AIL since enjoying his work as Chief Scientist. Bernie and his wife (Peg) live in East Norwich, Long Island, a small town south of Oyster Bay. Bernie's main hobby for many years has been salt-water fishing, mostly from the beach and in the surf, usually for striped bass and bluefish. When the fishing is slow, he gets out his binoculars and joins Peg in bird watching. They pursue these and related hobbies on Long Island, up at Cape Cod and occasionally down at Hatteras Island. For the past few years they have also been getting increasingly involved in community affairs. Somehow they find time also for gardening, for occasional museum trips, and for reading and music -- hi-fi music and the opera and ballet in New York City. They often talk about taking trips, as they once did, to more distant parts of the U.S.A. and abroad.

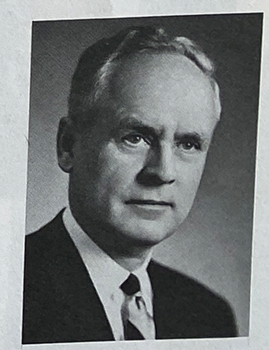


DON SINCLAIR, General Radio Company
West Concord, Massachusetts

Since the old RRL days, I have moved progressively away from personal involvement in technical activities via the route - Assistant Chief Engineer, Chief Engineer, Vice President for Engineering, Vice President and Technical Director, Executive Vice President, President, all at General Radio.

As you know, I went to the U.S.S.R. in 1958, following your pioneering visit in 1957, and again in 1962. I then chaired for five years the East-West Exchange Committee for the IEEE, which carried out the reciprocal visits between the IEEE and the Popov Society under the Scientific and Cultural Exchange Program between the U.S.A. and the U.S.S.R. I also attended the Telecommunications Colloquia held in Budapest in 1959 and 1962. During the past couple of years I have made several visits to France in connection with the purchase of our former representative's business in Paris. I have therefore spent quite a bit of time in Europe, on both sides of the Iron Curtain, and have learned some Russian and improved my French.

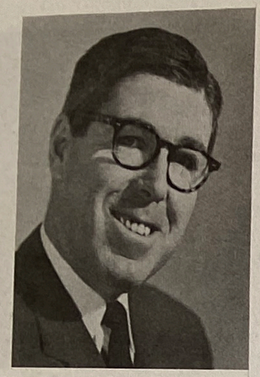
My oldest son received his Ph.D. in physics at the University of Rochester and has just published a book on Gas Laser Technology; my middle son is a student at Northeastern University studying electrical engineering; my younger son is in Iran, with the Peace Corps, after doing his undergraduate work in architecture at Cornell and receiving an M.S. in civil engineering at M.I.T.; and my daughter, after attending Brillantmont in Lausanne for two years, graduated from Finch College in New York City. She speaks French, Russian, German and Italian, and is looking for an appropriate job in San Francisco, where she is living with her husband, who is in the Army and stationed at the Presidio.



GEORGE SINCLAIR, Sinclair Radio Laboratories, Ltd.
122 Rayette Road, Maple, Ontario, Canada

In recent years my main activities have been in promoting my company and its products. I am still involved in antenna theory (there are still some unsolved problems) and still quite active in IEEE.

Since January 1969 I have been Chairman of the IEEE Awards Board and Director-at-Large. Although I am still nominally Professor of Electrical Engineering at the University of Toronto, my university activities are steadily decreasing, as I find it increasingly difficult to keep up-to-date in my field.



JACK SLATTERY, 103 Scott Adam Road, Cockeysville, Maryland

Jack Slattery first met many of the present "Jammers" during World War II, as a liaison officer to Division 15 from the Army Signal Corps Electronics Division in the Pentagon.

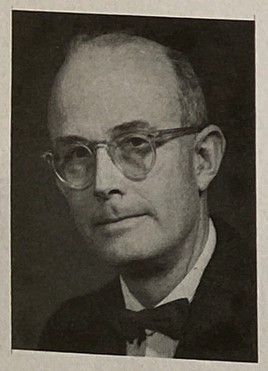
After graduation from Villanova University in 1930 he joined Bell Laboratories as an R&D engineer on high frequency radio transmitters, and later, RCA as a photophone engineer.

In 1936 he moved to the Army Signal Laboratories at Fort Monmouth, N.J. and was a member of the team that developed the SCR-268 and SCR-270 radars. Commissioned as an Army Signal Corps Officer in 1942 he was transferred to the Electronics Division of Signal Corps R&D Dept. in the Pentagon as Technical Executive Officer. As a civilian engineer he returned to the Signal Labs and later organized the Countermeasures Division.

He returned to industry in 1955, joining Magnavox in Fort Wayne, Indiana. He was loaned to the Weapon Systems Evaluation Group to participate in a special study of electronic countermeasures for DOD. On his return he was appointed General Manager of the Magnavox Research Laboratories in Los Angeles.

He joined Martin-Marietta at Baltimore in 1959, initially as General Manager of the new Electronics Division, and, later, as Director of Technical Survey on the Aerospace Group Engineering Staff. He retired from Martin-Marietta January 1970.

He is married, the father of three children, and counts as hobbies Photography, Biblical Archeology and Heathkit construction.

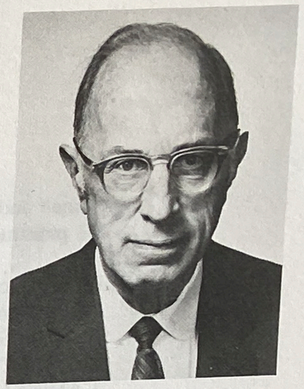


GREGG STEPHENSON, 22 Arosa Court, Greenlawn, Long Island, N.Y.

It is a bit sobering to realize that one has spent a quarter of a century with a single company (in my case AIL), but in retrospect this is based on interesting and varied work over the years, fair treatment throughout, and, I hope, a mutual compatibility. Most of my work has been related to receivers and reconnaissance equipment and systems, but just recently I've taken over the centralized technical support activities at AIL -- specialized aspects of mechanical and electrical design, reliability, engineering standards, and publications.

Rather than dwell on these vocational details, let me just mention a few avocations that have provided me (and my family) with much enjoyment. We are all amateur musicians of some description -- the main result being fun rather than perfect music. We enjoy sailing on a very modest scale, currently owning a Rhodes 19 sloop, with a canoe as alternate for rivers, lakes and off-season use.

We've had many interesting experiences camping throughout the USA and once in Europe, and combined with this, lots of enjoyable hikes and climbs including trips with the AMC and Sierra Club. Skiing has long been a favorite pastime for the whole family, with our kids, John (18) and Susan (15), now far outperforming their parents. Tennis on a low-pressure basis fills in some summer hours. Amateur radio was resurrected in 1951 after a lapse of 17 years, and has provided us with many good friends all over the world (Betty has long since joined this by getting a license). And finally, there must be some kind of a collector instinct in the family. For some years it has been coins, and recently a renewed interest in postage stamps; both provide worthwhile ties with history. One problem we'll never have is lack of something to do!

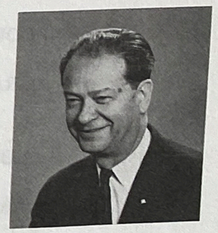


JAMES STOKLEY, 652 Kedzie Drive, East Lansing, Michigan

In 1956 I left General Electric to become Associate Professor of Journalism at Michigan State University, where I taught science writing. When, in 1959, they needed someone to teach the elementary course in astronomy I was asked to do it and was given a dual appointment in that department as well as journalism.

I retired July 1, 1969 and am now devoting myself to writing and travel. Last fall I completed the revision of my book: The New World of the Atom. It will be published later this year. The atomic energy field has developed into a large industry since the first edition appeared in 1957. At least 75% of the second edition had to be written anew. I have several plans for future books, including one on science writing.

I'm sorry that I cannot attend the 25th anniversary celebration of Division 15, but Sue and I are leaving on March 22 for a seven-week motor tour of Spain and Portugal. While you're enjoying the dinner on the 26th we'll be taking in the sights of Seville. Best wishes to all.



ORRIN TOWNER, 11008 Beech Road, Anchorage, Kentucky

After World War II, Orrin resumed his former duties at WHAS, Inc., Louisville, Ky. as Director of Engineering. During this period, he also designed and supervised construction of broadcast facilities and installation of technical equipment for AM, FM and TV, including field intensity measurements and proofs of performance.

Since 1968, he has been a consulting engineer covering technical problems in AM, FM, TV and Communications.

MIKE VILLARD, 2887 Woodside Road, Woodside, California

After his departure from RRL in 1946, Mike Villard went to Stanford Electronics Laboratories, where he is Professor and Director of the Radio Science Lab., his special field being radio studies of the ionosphere.

In 1955, he was elected "Outstanding Young Bay Area Engineer".

Currently, he is a member of the Naval Research Advisory Committee, the Air Force Scientific Advisory Board, NAS Com. Adv. to Air Force Systems Command, and a consultant to the Department of Defense, and others.

Mike is a fellow of the IEEE and in 1957 won the Liebman Award (IRE). He is a fellow of the American Association for the Advancement of Science, the American Geophysical Union; a member of the American Society for Engineering Education, the National Academy of Sciences, Phi Beta Kappa and Sigma Xi.

NDRC DIVISION 15

Names and addresses of members whose pictures and stories, etc. did not reach us in time for the printing of this brochure are:

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CAMPBELL, Mark E.
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CHASE, John P.
The Chase Building, 535 Boylston Street, Boston, Massachusetts 02116

CHINN, Howard A.
757 N.E. Bolanos Court, Port Charlotte, Florida 33950

CHRISTENSEN, John W.
Vice President & Associate Director, CBS Research Laboratories
227 High Ridge Road, Stamford, Connecticut 06905

DOW, Jennings B.
"The Oaks", Keswick, Virginia 22947

FRAENCKEL, Victor H.
R&D Center, Building K-1, General Electric Company
P.O. Box 8, Schenectady, New York 12301

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Executive Vice President, Vitro Minerals Corp., 90 Park Avenue, New York, N.Y. 10016

KAISEL, Stanley F.
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McCLEAN, J.F.
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SCHULZ, Robert F.
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SODERMAN, R.A.
General Radio Company, Bolton, Massachusetts 01740

TOLLES, Dr. Walter E.
Cove Neck Road, Oyster Bay, New York 11771

WEST, Julian M.
2929 Buffalo Speedway, Houston, Texas 77006

WINTER, Norman L.
1420 Chicago Avenue, Evanston, Illinois

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Instrument Trends

Countermeasure Spending Now at $15 Million Pace; Seen 'Sure' to Increase

By BILL HICKMAN
Fairchild News Service®

WASHINGTON.—The Defense Department, through several of its agencies, spends more than $150 million annually on electronic warfare—both countermeasures and counter-countermeasures—and the sum is sure to rise.

How much the sum rises depends entirely on the degree of protection desired. Some projects —notably protection against communications blackout from nuclear blast—are seemingly endless holes into which research money can be poured to increase the degree of protection.

For the most part, protection from jamming is achieved by increasing the signal-to-noise ratio capability of equipment and providing more transmission power.

High power and the logistics capability to move power sources to needed locations are prime factors in being able to hinder the enemy's ability to communicate.

Of course, this is an oversimplification of an extremely complex subject. The art of conducting EW (Electronic Warfare) does not come into battlefield play until the physical means of disrupting the enemy's electronic systems have been exhausted.

Research in EW concepts has been underway since before World War II, but the emphasis remains on research rather than procurement. Presently, the Advanced Research Projects Agency (ARPA), the Air Force, Army and Navy each have their own programs. About 60 per cent of the estimated $150 million spent yearly is for research; procurement accounts for the balance.

The services do about half the

Today's radar, however, could easily distinguish between this "chaffing" and a real target.

With the present state-of-art in technology, it is agreed by electronic specialists that absolute protection against jamming and the absolute ability to jam is impossible.

To achieve the greatest degree of protection, weight and price penalties must be paid—not to mention the price for complexity of a battlefield system.

ELECTRONIC NEWS, MONDAY, OCTOBER 4, 1965
Sec. 2

FIRST
SOLID
SIGNA
GENE

...Tuesday of this week. Lightning struck the barn at the property of Mr. and Mrs. Earl Rumery but the heavy rain ex-...ed the fire in short ...with Mrs. Rumery notify-...e Bridgton Fire Dept. ...fter it received her first ...

...ıtning also set fire to ... off the Hio Road. Smoke ...seen, but by the time the ...gton Fire Dept. arrived, had put out the fire.

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Central Maine Power
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...r 31, 1966
...ervice area

Paris Journal 1944-1965. By Janet ... Atheneum; 595 pp.; $8.95.

...chairman of the Senate ... state and Foreign ...

...herpetologists who know all ... about reptiles.

The AAAS has about 110,000 dues-paying individual members, but is also federated with some 300 other scientific and educational or-

...school (retired) University of Utah for creation of absolute rate theory, one of the sharpest tools in the study of rates of chemical reaction.

John Hasbrouck Van Vleck, Hollis professor of mathematics and natural philosophy, Harvard University for contributions to the theory of molecular structure.

Box 3
Folder: 13

Friday, July 16
$2.50
SMALL SIRLOIN STEAK
French Fries - Vegetable
Bread - Salad
Dessert - Coffee

Sunday, July 17
$2.25
ROAST TURKEY
Stuffing - Cranberry Sauce
Mashed Potato - Vegetable
Bread
Dessert - Coffee

Tuesday, July 19
$2.75
LOBSTER - STEAMED CLAMS
Bouillon - Drawn Butter
French Fries - Salad
Home made Bread
Dessert - Coffee

Thursday, July 21
NEW ENGLAND BOILED DINNER
Corned Beef
Carrots - Turnip
Potato - Cabbage
Bread - Butter
Dessert - Coffee

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O.V. GREEN BEANS 303 cans
R & W POTATOES
B.R. FACIAL TISSUE
B&M BEANS
Bessey's Preserves
Bessey's APPLE JUICE
Pillsbury BISCUITS
Nabisco Chips Ahoy

...ge 16 Section) ...RA R... December 25,
S.F. Sunday Examiner & Chronicle

11 Leading Scientists Get Medals

AUSTIN (Tex.)—(UPI)—President Johnson announced yesterday 11 winners of the 1966 National Medal of Science whose discoveries range from insect pest control to computer brains.

The awards, recommended by the President's Committee on the National Medal of Science, is the Federal Government's highest tribute to scientific and engineering achievements.

"Behind the brief words of the citations stand real men who every day are lighting the dark areas of our knowledge," Johnson said.

He said among the versatile group are men who helped wipe out destructive pests for southwestern livestock raisers, the "father" of television and the originator of modern meteorology.

The winners are:

Edward Fred Knipling, director, Entomology Research Divisions, Department of Agriculture for contribution to control of insects responsible for diseases of humans, domesticated animals and plants.

Fritz Albert Lipmann, professor of biochemistry, Rockefeller University for original discoveries of molecular mechanisms for the transfer of energy in living cells.

Williams Cumming Rose, professor of chemistry, emeritus, University of Illinois for studies on amino acid requirements of man and animals.

Sewall Wright, professor of genetics, emeritus, University of Wisconsin for contributions to the mathematical foundations of the theory of evolution.

Claude Elwood Shannon, Donner professor of science, Massachusetts Institute of Technology for contributions to the theories of communications and information processing.

Vladimir Kosma Zworykin, honorary vice president, Radio Corporation of America for major contributions to television and the originator of science and engineering to television and medicine.

John Willard Milnor, professor of mathematics, Princeton University, for ingenious approaches in topology which have solved long outstanding problems.

Jacob Aall Bonnevie Bjerknes, professor of meteorology, University of California, Los Angeles, who discovered the cyclone-making waves of the air and the climate-controlling changes of the sea.

Subrahmanyan Chandrasekhar, professor of theoretical astrophysics, University of Chicago for superb contributions to stellar astronomy, physics and applied mathematics.

Henry Eyring, dean, graduate school (retired), University of Utah for creation of absolute rate theory, one of the starkest tools of chemical research.

John Hasbrouck Van Vleck, professor of mathematics and physics, emeritus, Harvard University for contributions to the theory of electric and magnetic properties of matter and to the study of rates of chemical reactions.

'World Series of Science'

WASHINGTON — (AP) — Ph.Ds and Phi Beta Kappa keys will be a dime a dozen when one of the world's largest science meetings — sometimes called the "world series of science" — opens Monday in the nation's capital.

The event will be the week-long, 133rd meeting of the American Association for the Advancement of Science (AAAS) — the world's largest general-science organization.

This year's theme: "How man has changed his planet."

Subject matter will range from the bowels of the earth to the suburbs of the universe as an estimated 10,000 scientists from more than a dozen countries will listen to literally hundreds of reports — at some 200 different sessions.

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